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ABSTRACT

This document is a pilot program of an interdisciplinary nature that complements the existing curriculum utilizing value clarification strategies. Included in this publication are a variety of value encounters. The value encounters are divided into four broad conceptual areas: (1) Environmental Management; (2) Environmental Quality; (3) Environmental Ecology; and (4) Sociocultural Environment. For each encounter, there is an introductory section, behavioral objectives, activities, values strategies, and a bibliography of useful resources. The activities are graded for applicability, grades 7-9, 10-12, or 7-12. (RH)

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VALUING THE ENVIRONMENT

Charlotte-Mecklenburg Schools

7-12

ED134449

SE 021 920

VALUING THE ENVIRONMENT - SECONDARY
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June, 1975

introduction

Valuing the Environment-Secondary is a pilot program of an interdisciplinary nature that will complement the existing curriculum utilizing values clarification strategies. The thrust of the program was teacher-student development of problem-solving encounters directed toward present-day environmental problems.

The objectives of the program were:

- to give students the opportunity to inquire into the values issues raised by environmental problems and to motivate them to become involved in their solutions.
- to provide students with the knowledge and skills necessary to become intelligently involved in the solution of environmental problems through the use of environmental education materials developed by the interdisciplinary team of teachers and students.

All encounters which have been written include an introduction, behavioral objectives, tested activities for attaining those objectives, values strategies to stimulate the "deep-thought" process, and a resource section. In addition some encounters have overhead projectual masters and several have audio-visual materials which accompany them and these are available through the Environmental Education Center. The encounters will fall into one of four broad conceptual areas - Environmental Management, Environmental Quality, Environmental Ecology, and Sociocultural Environment. Within each of these conceptual areas many academic disciplines are represented - art, biology, math, history, environmental science on the senior high level and junior high science, social studies, and language arts.

To facilitate the use of these encounters in an interdisciplinary manner each encounter has been color-coded according to its major thrust into one or the other of the four conceptual areas. The outline on the following page shows four things -- 1) title; 2) grade applicability ; 3) subject applicability; and 4) conceptual areas. Upon examination of the outline it will be noted that there is a great deal of overlap in subject and conceptual areas. While this is highly desirable from an interdisciplinary standpoint it is somewhat confusing from a practical standpoint. To facilitate the use of the outline the numbers from 1-3 are used to indicate the primary, secondary, or tertiary emphasis of the encounter. The color code will enable the teacher to rapidly find just the right encounter -- yellow will be for Environmental Management; blue for Environmental Quality; green for Environmental Ecology; and pink for Sociocultural Environment.

With the physical facts of the construction all that now remains is trying the encounters that are appropriate for your subject and level. Two last thoughts for any teacher who uses these materials -- if a student should choose not to respond to a values clarification activity he should be permitted to pass -- with respect. The second thought is that teachers should also participate in the values activities whenever possible; however, teacher participation should come after student participation to avoid the "teacher-knows-the-right-answer" syndrome. Instructions for all the values activities are discussed in the book VALUES CLARIFICATION, A HANDBOOK OF PRACTICAL STRATEGIES FOR TEACHERS AND STUDENTS, by Simon, Howe, Kirshenbaum and published by Hart Publishing Company, New York, New York, 1972.

contents

Title of Encounters	Grade Applicability			Subject Applicability						Conceptual Areas				
	7-9	10-12	7-12	Eng.	Fine Arts	Math	Life Science	Physical Science	Social Studies	Env. Awareness	Env. Quality	Env. Ethics	Interrel. Systems	Human Values
Activism: Legal Alternatives	*								1	2			1	
Ceramics: A Dirty Encounter		*			1									
Civil War: Land Destruction	*								1	1				
Clean City: Solid Wastes in the Queen City			*				1		1	1				
Consumer Ecology: Cut Down Wastes							1		1	2				
Crafts: A Return to a Simpler Life			*		1									
Energy: Economy vs Ecology	*						1		1		1			
Energy: Prospects For the Future		*					1	1	2					
Environmental Questions: Research	*			1					1	1				
Eutrophication: How Lakes Die		*					1	1	2		1			
Famine: Stork vs Farmer		*		3			2		1	2				
Human Succession: Utterly Dismal Theorem		*					1		1	1	2			
Insectivorous Plants: Environmental Oddity		*		2	2		1							
Interdependence: Food For the World			*				1		1					
Kikuyu: Development or Preservation		*							1	2				
Kudzu: An Introduced Pest		*					1							
Land Use: Suburban Fringe Development		*					1		1	1				
Living Together: Plants & Animals	*						1			2				
Metrolina Minerals: Wise Use		*					1		1					
Pollution: Impact on You	*			1										
Population: People, People, and More People		*					1		1					
Preservation: Man's Env. Attitudes	*								1	1				
Primitive Cultures: Return to Good Life			*						1	1				
Psychology: Changing Values	*			1					1	1				
Science Fiction: Fantasy in Problem Solving	*			1			1	1		2				
Settlements: Effect & Env.	*								1					
Solutions: Gen. Math & Env.			*			1	2	2		1	1	1		
Symbiosis: Living in a Real World		*					1			2				
Throw Aways: What Can Be Done?		*		1				1		2	1	2		
Trigonometry: Measuring the Env.		*				1	1	1			1	1		
Urban Life: Good and Bad			*		1		2		1		2		1	
Water Pollution: "Nor any drop . . ."		*		1			1		1		1	2		
Westward Movement: Who Owns the Land?		*							1	1	2		2	

CIVIL WAR:
Example of Land Destruction

I. INTRODUCTION

The activities of man are not without impact on the land and its resources. Activities of widespread import leaves scars healed only by decades or centuries. The Civil War and the Reconstruction Period had great impact on the culture and environment of the South. The land was laid waste by events of the war - - most notably Sherman's March to the Sea. Reconstruction, which followed the war, had long-lasting impact on the culture and environment as well. Many of the ravages were economic and the land bears the scars today.

The South was an agrarian society supported by the use of slaves. During Reconstruction large plantations were broken up, yielding cheap land for any who could afford it. Mills moved South -- because labor was cheap, water for waste disposal was abundant, and cheap, and the materials of production, primarily cotton were produced in the South. Mill villages have left an indelible mark on the southern countryside -- and on the waters, and even in the air.

Patterns of economic deprivation have left other scars -- substandard housing, and a proliforation of mobile homes on small plots of land. Certainly, there is no direct link between the Civil War, Reconstruction, and all land uses of the modern, South, but closer examination of the South's last hundred years is a study of interest with regard to land uses of today.

II. BEHAVIORAL OBJECTIVES

At the conclusion of a successful encounter, the student should be able to demonstrate an:

1. Understanding of the effect that the Civil War and Reconstruction had on the South's culture and economical structure.
2. Understanding of the civil rights of each man.
3. Understanding of the growth of the Black man from slave to freeman.
4. Understanding of the rise of the middle class.

III. ACTIVITIES

1. On a map, show the major battles of the Civil War and Sherman's March to the Sea.
2. Make a chart to show industry in the South before and after the war.
3. Describe the difference in the educational system before and after the war.
4. Explain how the Black man evolved from slavery - to freeman - to his role in society today.
5. Describe how the change in the economical structure brought about the rise of the middle class.
6. Explain how the economic system changed in the South before, during, and after the war.
7. Explain how Reconstruction caused the organization of the Ku Klux Klan and the difference of the KKK then and today.
8. Write biographies of the important leaders of this perion.

IV. VALUES CLARIFICATION

A. Write a newspaper as if it were being written in either the Civil War and/or the Reconstruction Period, doing editorials and news items of importance. (Have different views expressed in the editorials. The news items would be reported by the North and the South).

VS

Role Playing:

1. Pretend that you are a member of the KKK and tell why you are a member and how you feel about being an active member of this organization.
2. Pretend that you are a Black man that has just been told that he is free. Describe your emotions as you hear this news and what you are going to do with your freedom.
3. Pretend that you are a Yankee soldier and write a diary of your life in the South during the Civil War and Reconstruction.
4. Pretend that you are the mistress of a large plantation before, during and after the Civil War.
5. Pretend that you are a former Southern soldier and describe your reactions to the Reconstruction.
6. Write a play using the above characters to explain the different emotions and beliefs of each.

RESOURCES

Books:

After the Civil War, A Pictorial Profile of America from 1865 to 1900, John A. Bley, Bonanza Books, New York, 1960.

Black Power U.S.A. The Human Side of Reconstruction, 1867 - 1877, Lerone Bennett Jr., Johnson Publishing Company, Inc., Chicago, 1967.

New Dimensions in American History Andrew Johnson and the Struggle for Presidential Reconstruction, 1865-1868, Garry G. Baker, D.C. Heath and Company, Boston, Mass., 1966.

Sherman's March through the Carolinas, John G. Barrett, The University of North Carolina Press, Chapel Hill, 1956.

The Confederate States of America 1861- 1865, E. Morton Coulter, Louisiana State University Press, 1950.

This Hallowed Ground The Story of the Union Side of the Civil War, Bruce Catton, Doubleday and Company, Inc., Garden City, N.Y., 1956.

Filmstrips:

"Causes of the Civil War," Encyclopedia Britannica, 1958.

"From Bull Run to Appomattox," Encyclopedia Britannica, 1959.

"From Shiloh to Vicksburg," Encyclopedia Britannica, 1959.

"Life History of the United States: The Union Surrendered" 1961-1865.

"Sherman's March to the Sea," Encyclopedia Britannica, 1959.

" The Civil War," 20th, 1961.

" The Civil War at Sea," Encyclopedia Britannica, 1958.

"The Country during Civil Wartime and Reconstruction, 1861-1877," 1960.

"The Reconstruction Period," Encyclopedia Britannica, 19[illegible].

CLEAN CITY:

SOLID WASTE IN THE QUEEN CITY

I. INTRODUCTION

Solid wastes are generated by every living organism. This includes amoeba and man as well as petunias and orchids. If all organisms generate waste then why is there such a furor over the wastes that man generates? No one gets on a soap-box and screams about the orchid dropping petals and polluting the earth, but let a human drop a little piece of paper and there is an immediate furor. Why?

Reasons for this seeming inequity lie in the fact that solid waste may be a perceptual problem as well as a physical problem. People do not talk about the trees in the forest littering the ground with leaves, seeds, branches, and twigs. When man lived apart from other men, solid wastes presented few if any problems. It was only when man moved together for protection, commerce, and companionship that the accumulation of wastes became a problem. Men living together generate basically no more wastes than man living alone. This is an obvious dilemma.

It is not the quantity of waste that is produced that is much a problem rather the amount that must be gotten rid of in a comparatively small area. This could be thought of as misplaced resources. In simple, less urban, settings the product was grown, or manufactured in the same area in which it was consumed. As cities grew it became increasingly necessary to ship materials in since the area could not provide the necessary raw materials for the town to exist. Food grown in Arizona and Florida is consumed in New York and Chicago. Clothing manufactured in Boston and Cleveland is sold in Reno and Selma.

This encounter will explore the size of the problem and suggest possible alternatives to help minimize the situation. The suggestions are as applicable on the small scale of a school or the larger scale of a community or county.

II. BEHAVIORAL OBJECTIVES

At the end of a successful encounter the student will be able to:

1. Explain the several types of waste disposal methods and select and defend the one of his choice.
2. Trace a pathway from origination to final destination of a farm produce and a manufactured one.
3. Design and implement a personal plan for recycling in the home.
4. Communicate the plan to his friends and peers and encourage them to come up with their own plan.
5. Design a plan for the school attended and implement it with the help of the principal and the student government.

III. ACTIVITIES

1. Using reference materials find the three major disposal methods, then compare and contrast them. Pay attention to the one which Charlotte uses.
2. Using the information from 1 above draw a flow chart of Charlotte's waste disposal.
3. Look in your garbage can at home and select any three items. Use a map trace the material from origin, to manufacture, to sale, to use, to disposal.

4. Use the transparency project developed by the Madison Schools (see bibliography) and talk to a school, church, community group and them report on the attitudes expressed.
5. Develop your own plan for recycling more materials than you presently do. Make this plan known to your classmates.
6. Use potted plants and a variety of solid wastes and after a period of time in which the materials are buried in the soil take them out and compare to see which material is most biodegradable. Use plastic, paper, cloth, glass, metal, etc.
7. Plan and conduct a class seminar for other classes, the school, etc. on solid waste - Problems and Solutions.
8. Find out who in Charlotte is conducting a solid waste reduction effort and get involved.
9. Develop a visual display to encourage others not to pollute.

IV. VALUES CLARIFICATION

1. Voting Questions: By rasing your hand answer the following:
   a. How many of you buy beverages in nonreturnable containers?
   b. How many of you use plastic garbage bags?
   c. How many of you recycle those plastic milk cartons?
   d. How many of you do any composting with your food scraps, grass clippings, leaves, etc.?
2. Future Game: Pretend you are an alien space traveler and you were to come upon a garbage dump on Earth that had been abandoned for about 300 years. List the things that you would probably find. Try to decide as an alien would what the dump tells you about the people.
3. What should you do if -
   a. You saw a city garbage truck spill garbage along Independence Blvd.
   b. You saw a restuarant at SouthPark dump its food scraps in an open garbage can behind the center?
   c. You saw a student littering in the halls? on the campus? in your yard? If there's a difference why?
4. Team Effectiveness game from the Charlotte Clean City Committee materials. (found in appendix)

V. BIBLIOGRAPHY

Terrestrial Ecology, William A. Andrews, Prentice-Hall, 1974

Report - Solid Wastes Study - City of Charlotte & Mecklenburg County, Henningston, Durham, Richardson, Charlotte, N.C., 1972.

Abstracts, Excerpts, and Reviews of Solid Wastes Literature, Vol IV, University of California Press, 1971.

Assessment of the Effectiveness and Effects of Land Disposal Methodoligies, U.S.Army Corps of Engineers, Gov.Printing Office, 1972.

A Citizen's Action Handbook, Refuse Act Permit Policy, NRDC Project, New York, N.Y. 1972.

Sanitary Landfill Facts, U.S. Dept. of Health, Education, and Welfare, 1970.

Let's Dump the Dump, United States Environmental Protection Agency.1971.

Env. Education Center, Dr. Larry Liggett, Madison County, N.C. Title III -"Solid Waste Unit."

Recycling Resources - - A Game, C. Richard Hatch Associates, 1971.

VI. APPENDIX

Overview:

- In a few minutes I'm going to pass out 12 true-false questions about litter and littering behavior.
- We'll take a few minutes to answer it individually, then our groups will share our individual answers, the reasons for them, and come up with a team solution.
- Don't worry, it isn't a quiz or test we're going to be marked or graded on - the reason we are doing this is to help make sure we understand the information in the presentation.
- When we finish the group discussion and have our team solution we'll give you the answers to the questions so you will know how you did.
- In the wrap-up we will have a chance to discuss the reasons for the answers.

Directions:

- When you get your questions, answer them true or false based upon what you remember from the presentation - take about 10 minutes.
- We will have 20 minutes to come up with our team solution by sharing our answers and the reasons for them.
- In getting our team solution we should:
  1. Get consensus on the answers - that is agreement from the total group that the answer is true or false. Let's not just mechanically vote on the answers.
  2. Answer all 21 questions - so we will have to be careful of our time.
  3. Work to get as many right as possible. In the wrap-up we will have a chance to see how each group did in working together.
- To determine how we did as a team by comparing our team score to the average of our individual scores, don't change your answers on your questionnaire.
- Your position can change as a result of discussion but don't change the true or false on your answer sheet.
- When you finish we want you to score your own answers, total the number correct for each member of the group and then divide by the number of people in the group to get an "average team member score."
- When you work in your group it would be a good idea to elect a chairman and someone to keep track of your team solution.
- Good luck. Let's see which team will do the best job of working together to get the most answers correct.

- Pass out questions and have participants answer.
- After about 10 minutes or when everyone has completed the quiz, break into groups.
- Remind everyone of the time when the groups are to have completed their team solutions.

Litter Group Effectiveness Quiz

T. F. 1. In social-change programs, the less study the better. Get right down to work.

T. F. 2. When most people in the United States talk about litter, they really know what they're talking about.

T. F. 3. Careless pedestrians and motorists cause most of the litter in this country.

T. F. 4. The litter problem would be solved if we reduced the amount of beverage and food-product packaging in the country.

T. F. 5. The first-year goal of every litter-reduction program should be to reduce litter to the 0 level.

T. F. 6. It would help if everyone began to think of litter as a solvable problem, rather than as a crisis.

T. F. 7. Unless you tackle the whole city you live in, you can't clean up a small part or neighborhood.

T. F. 8. When you get right down to it, we can't change our littering behavior norms.

T. F. 9. People will only pick up litter in areas that they feel they "own" or "belong to them" in some way.

T. F. 10. The key in litter reduction is to find the one group that most contributes to littering, and come down hard on them.

T. F. 11. Once we've changed the norms of the people who actually litter, we don't have to be concerned with the norms of the litter gatekeepers.

T. F. 12. Firm enforcement of litter laws is the single most important ingredient in solving the litter problem.

Litter Group Effectiveness Answers

1. In social-change programs, the less study the better. Get right down to work.

   False.

   Many litter-control programs have failed because time wasn't taken to look carefully at local conditions and situations and to take advantage of methods that have been devised to meet them. The order should be: analysis first, clear up the confusions, then act.

2. When most people in the United States talk about litter, they really know what they're talking about.

   False.

   Litter is different things to different people. To some, it's a few scraps of paper. To others, it's a junked car or a heap of garbage. There is no common demominator. It's also a matter of one's individual perception.

3. Careless pedestrians and motorists cause most of the litter in this country.

   False.

   They are major contributors. But recent surveys of 105 cities in 17 states show that, in the aggregate, the five other sources accounted for a larger percentage of the total litter.

4. The litter problem would be solved if we reduced the amount of beverage and food-product packaging in the country.

   False.

   Surveys show there are 150 separate items of litter. In order to make a major dent in the litter problem through this method, a host of items people can't do without would have to be eliminated. Even newspapers, for instance. Norms and the system produce litter. Not products.

5. The first-year goal of every litter-reduction program should be to reduce litter to the 0 level.

   False.

   We'll probably always have some small amount of littering, but man-made litter can be reduced to a minimum acceptable level.

6. It would help if everyone began to think of litter as a solvable problem, rather than a crisis.

   True.

   Life will go on, as it has to date, even if there's more litter around than there is today. Regarding it as a crisis will presipitate more ill-conceived panaceas. Viewing it as a problem is the only way to produce rational answers.

7. Unless you tackle the whole city you live in, you can't clean up a small part or neighborhood.

False.

There are countless instances of residents building islands of cleanliness in the midst of normally dirty cities. In fact, an effective strategy is to make and keep small areas clean and gradually to expand them until eventually they include the entire community.

8. When you get right down to it, we can't change our littering behavior norms.

False.

If there is a real desire in the community to have clean surroundings, human norms can be changed. Practices that produce litter can be replaced with practices that produce cleanliness.

9. People will only pick up litter in areas that they feel they "own" or "belong to them"in some way.

True.

The key is to build people's sense of involvement, pride and sense of "ownership" in all areas of the community.

10. They key in litter reduction is to find the one group that most contributes to littering, and come down hard on them.

False.

Blame-placing or scape-goating a single group is a sign that the entire litter-culture or system is not sufficiently understood. The key is to confront the gatekeepers and litterers at all seven sources within the litter system or culture.

11. Once we've changed the norms of the people who actually litter, we don't have to be concerned with the norms of the litter gatekeepers.

False.

No matter what the norms of the litterers are, if there is inadequate containerization at the seven sources, there will eventually be litter. Also, we will probably always need litter change-agents to monitor and sustain this effort.

12. Firm enforcement of litter laws is the single most important ingredient in solving the litter problem.

False.

Sanctions or enforcement is a vital ingredient in norm change. Positive sanctions, however, or reinforcement are as essential as the negative. Having basic rules to go by is fundimental to any litter-reduction program.

ENVIRONMENTAL QUESTIONS:

Research and Communication

I. INTRODUCTION

Environmental problems are not new -- they have plagued mankind for years. Today concern is heightened. There is lively debate among concerned scientists and citizens as to the cause of pollution. Most agree that man is the primary polluter -- that man's desire for convenience and unconcern for waste have brought us to a point where the future of life on this planet as we know it has an uncertain future.

Ecologists -- scientists who study the relationship between the living and non-living environment -- tell us that the overload of unnatural, man-made wastes, is disrupting natural cycles and that the impact is being felt globally. The "free" use of everybody's air and water for the disposal of factory wastes pollutes in a big way. Man's desire for convenience -- automobiles, disposable paper products, throw-away bottles-- contributes to pollution. The turn around of such wasteful habits will be a long and expensive one.

If people are the cause of pollution, then people will have to solve pollution problems. Each one of us is a polluter and we must become aware of how we can curb our negative impact on the environment. A first step is to become informed -- read, discuss the problems with local officials, take field trips, talk with environmental experts. Being aware is not enough. If something is going to be done, we all have to do it. As well as making changes in your daily life -- by using the automobile less, by using returnable bottles, by insulating your home to conserve energy, etc. -- you can contribute to the solution of important environmental issues.

You can also become involved in community action to solve environmental problems. It's best to select one important issue at a time. After you are well-informed on the facts, find out who's working on the problem. Join a local or state conservation organization. MECA(Metrolina Environmental Concern Association), the Sierra Club, and the Autobon Society have local groups, CCNC(Conservation Council of North Carolina) is a state organization. Write your congressman and state legislators. Commit yourself to do something about your concerns!

II. BEHAVIORAL OBJECTIVES

At the conclusion of a successful encounter, the student should be able to demonstrate:

1. Knowledge of the principal causes of environmental destruction.
2. Knowledge that environmental management involves the application of knowledge from many different disciplines such as economics, biology, and sociology.
3. Knowledge of how to use research and communication skills such as various forms of writing and oral deliveries in making others aware of environmental problems - example - talks, displays.
4. Association personally with the environment through actual projects such as collection of insects, growing of plants, collection of leaves, and field trips.

III. ACTIVITIES

1. Locate books and pamphlets in your school or public library for a class display that will help you get to know the materials of natural resources - the plants, animals, soil and water.
2. Find information concerning the amount of money spent by the consumer on conveniences such as automobiles and throw-away bottles, cans, and plastic containers. What happens to these items after they are used?

Write to Metrolina Environmental Concern Association, 5033 Erickson Road, Charlotte, North Carolina 28205.

3. Write to Environmental Education Program for North Carolina, Post Office Box 5125, Raleigh, North Carolina 27607 for information on conservation, ecology, or the environment in general. Set up a display in the classroom with materials.
4. Write letters to your Congressman and state legislators asking for information about bills and pending legislation on environmental management. This should be done on a local level also. Check with The Sierra Club, Central Piedmont Chapter.
5. Try to get someone from the Water Quality Division - Water and Air Resources, North Carolina Department of Natural and Economic Resources, Concord, North Carolina to come and speak with your class. Also consider seeking information from the U.S.Department of Agriculture-Soil Conservation Service, Raleigh, North Carolina.
6. Take a field trip to your community's water department or electric company, gas company and city sanitation department, including the land fills to find out how these services function in regard to the environment.
7. Organize a debate in your classroom about environmental management, "pro" and "con" sides should be adequately represented.
8. Make a list of adjectives and verbs which vividly describe and show by actions various aspects of nature.
9. Read poems such as Robert Frost's " Stopping by the Woods on a Snowy Evening." Decide what the author's intent was and write an essay describing your reaction to the poem.
10. Colors, smells, and sounds in nature offer great diversity and beauty in what might otherwise be a very dull scene. After a short walk around your neighborhood, consider if this kind of activity can be worthwhile for others.
11. On a state map locate all the national forests, parks, game preserves, which you might be able to visit. Very creative compositions, poems, essays, can come about as a result of these experiences.
12. Each student should decide what he can talk about in reference to the environment as part of an assignment after environmental visits have been completed. Students can speak before Scout groups or other assemblies.
13. Have the class experiment in the classroom with producing their own flowers, or growing their own seedling trees, or cleaning the area around their school, or collecting leaves or insects for display. Each student can decide if his community can benefit from these kind of activities. Keeping a journal during these experiences can be rewarding for the student. Seek assistance from the Sierra Club at Central Piedmont College or some other environmental organization.

IV. VALUES CLARIFICATION

A. Values Voting

1. Do you think we need cars?
2. Do you think we need air conditioners?
3. Do you think we need electric clocks?
4. Do you think we need television?
5. Do you think we need electric knives, can openers, and toothbrushes?
6. How many would rather live in the city?
7. How many know what a "ghetto" is?
8. How many would rather live in the country?
9. How many are familiar with five environmental problems in the City of Charlotte or Mecklenburg County in general?

B. Role Playing:
Mary is a nut about environmental management. She goes downtown to City Hall to complain about several trees that are being cut down to make way for a highway. She tries to persuade the City Council to reconsider their orders. Some students can portray interested citizens, some can portray the City Council, and others can prepare to take the opposite view from Mary to present all sides.

C. Continuum:
1. Where would you place yourself on the line?

Martha drives a car to school, work, church and play. All of these activities are no more than a block from her home. On the other hand, Walking Lucy lives on the same street, goes to the same church and school. She walks everywhere, even across town to her sister's house.

D. Word Association:
1. Show students several pictures of plants and animals. Have them write in 60 seconds eight words which come to mind immediately. Some students can share with the class those words which they jotted down.

V. RESOURCES

Books:

Air and Water Pollution, Gerald Leinwand, Editor, Washington Square Press, 1969.

Challenge and Change -- United States History: The Second Century. Ebling, Johnson and Perrone, Laidlaw Brothers, 1973.

Clarifying Values Through Subject Matter: Application for the Classroom, Harmon, Kirschenbaum, and Simon, Winston Press, Inc. 1973.

Dictionary of Ecology, Herbert C. Hanson, Bonanza Books, 1962.

Environmental Quality The First Annual Report of the Council on Environmental Quality, U.S. Government Printing Office August, 1970.

Essays on Community Life and Activities, Dimensions for Charlotte-Mecklenburg, February, 1974.

The Economic Impact of Pollution Control: A Summary of Recent Studies, Council on Environmental Quality, Department of Commerce, and Environmental Protection Agency, March, 1972.

The Environmental Handbook, Garrett De Bell, Editor, Ballentine Books, Inc., 1970.

Films:

"The River Must Live," Mogul Corp.,% Mr. W. H. Shinn, Division Manager, Charlotte, North Carolina, 375-5726.

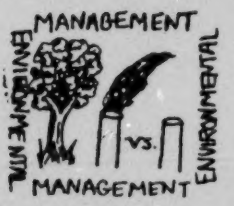
"So Little Time," 20 min., color, Corporation of America.

Filmstrips:

"Environmental Crisis," Words, 1971. A set of 6 filmstrips.

(Films and filmsstrips available through Charlotte Nature Museum and Charlotte-Mecklenburg Schools.)

LAND USE:
Suburban Fringe Development



I. INTRODUCTION

There is growing concern in this country about unplanned, blanketing urbanization which causes communities to lose their identities; about faceless suburbs which crawl from the city center to the countryside; and about unsightly development which stretches endlessly along major highways. Poor planning and random development are not only unsightly, they are costly to the natural and cultural environment. In fact, most environmental degradation can be traced to a human use of the land.

The impact of man's use of the land is intensified by urbanization. As urbanization increases, the stress on natural systems increases. As watersheds are deforested and paved, flooding, sedimentation, and destruction downstream increase. As urban areas grow closer and closer together, animal life is displaced, and natural systems are displaced by commercial, residential and industrial systems.

From 1960 to 1970, Mecklenburg County's population increased 30 percent, to 355,000. This number is expected to double by 1995. Man's impact on the land is increased not only by population growth, but by an increasing per capita "appetite" for land as well.

It has been estimated that 8000 acres per year are being developed each year in Mecklenburg County. Suburban development has focused on the southeastern and eastern portion of the county, while industrial growth has moved west and north of Charlotte. Generous amounts of land have been "reserved" for industrial development, and actual industrial growth figures fall short of predictions. Some have suggested that this has encouraged urban sprawl.

Until very recently, land use planning was regarded as a local responsibility and urban land use had traditionally been controlled by zoning. However, there are additional tools which local governments can employ to control land use. Tax power can be used to increase development pressures in some areas (by taxing at lower rate) and to decrease development pressures in other areas with high tax rates. local governments can prevent development in certain areas be refusing to provide services such as sewers and roads. It can encourage development by providing these same services.

In several European countries, particularly Sweden, the most effective planning has occured when the public actually owns the land. " Land banking" is outright purchase of the land by the municipality or county for purpose of controlling future development.

While there is no overall land scarcity in this country, the 1970's will be the years when local, state and the federal government will look closely at the use of all lands, to make decisions about that use which will insure a quality environment for future citizens.

II. BEHAVIORAL OBJECTIVES

At the conclusion of a successful encounter, the student should be able to:

1. Diagram and describe the general zones of land use as described by the Soil Conservation Service. (Refer to Odum, Eugene L., Fundamentals of Ecology, p. 420-431.)
2. Recognize zoning codes and zoning practices.
3. Plan and diagram an ideal suburban area.
4. State the plans for the growth pattern of Charlotte-Mecklenburg through 1995.

5. Become actively involved in technique of challenging zoning changes.
6. Compare Leopold's "Land Ethic" philosophy, vs. pioneer land ethic philosophy.

III. ACTIVITIES

1. On maps of Charlotte-Mecklenburg show:
   a. Proposed Land Use plan for Charlotte-Mecklenburg
   b. Housing units (present and future)
   c. Shopping centers
   d. Commercial land uses
   e. Industrial parks
   f. Proposed industrial zoned land (all uses)
   g. Parks, including bike trails, existing and proposed
   h. United States Soil Conservation Service Land Use Classification (p. 421, Odum)
2. Visit City Hall, and study composite map of proposed areas.
3. Research urban development; its history, present status, and plans for future. Draw up a plan you think would be suitable for Charlotte-Mecklenburg.
4. Secure speakers or personally interview the following officials:
   a. Mayor
   b. Residential developer
   c. Commercial developer
   d. County Commissioner
   e. Member of planning commission

   (The following questions may be appropriate as guides: Zoning: What is zoning? How does it affect traffic congestion? Where does the authority for zoning come from? How do we reconcile zoning restrictions with our heritage of individual property rights? How is zoning changed or amended? What recourse does a citizen have who disagrees with a decree of the zoning board?

   For Mayor or member of Planning Commission:
      1. For what reasons would a city want to grow larger? What advantages has the larger city? What disadvantages?
      2. How, idealistically, should a zoning board function? In practice, what has happened?
5. Gather information on the following specific proposals:
   a. Sugar Creek Canal
   b. McAlpine Parkway
   c. Bike trails
6. In each of the following areas, make an inventory -- a visual or pictorial investigation, using any method of data collection that seems appropriate. For example: opinion polls of residents, questioning, counts of facilities, traffic counts, maps in greater detail, etc. Look at each area with these things in mind:
   a. Components -- wooded, farm, residential, industrial, commercial, natural resources, water erosion, sewage disposal.
   b. Past/present/future -- make a visual overview of the area.
   c. Problems.
   d. Planning.
      1. Shopping center
      2. Residential neighborhood
      3. Industrial/commercial area
      4. Rural area on the urban fringe.

   Some questions for discussion:
   a. What are some of the component parts interrelated?
   b. How are the different areas interrelated?

c. In what ways are the component parts interrelated?
d. What are some "focus" words (themes) that could be used for further study of this area?
e. What examples did you find in your area that:
   1. Illustrate the past?
   2. Typify the present?
   3. Indicate the future?
f. What do you recommend for meeting the future needs of your area?
g. If you were the City Planning Commission, what guidelines would you develop for consideration of future developments in your area?
h. Identify three factors that affect the quality of your area.

7. Make an Environmental Impact Study on the effect of these developments on the surrounding areas for example:
   a. Eastland Shopping Center
   b. Dilworth area, including restoration efforts

IV. VALUES CLARIFICATION

A. Either/Or Forced Choise:
(May be used as an introduction to Land Use Encounter).
Pick five or six of the following items. Divide room in half and have students move to side designated when they make their choice. Each student will pick a partner and discuss reasons for his choice. Students must pick DIFFERENT partner each time. Time limit: 2 minutes for discussion.

Big House	Small cottage
Penthouse	Bungalow
Split-level	Apartment
Walk	Ride
Motorcycle	Tandem bicycle
Gourmet cook	Hardee's fan
Bubbling brook	Placid lake
Screened porch	Picture window
Mountain	Valley
A stitch in time	Better late than never
Manicured lawn	Woods
Rural road	City street

B. Public Interview:
Teacher asks for volunteers. Teacher may ask student any question that the teacher in turn is willing to be asked. Student has the option of passing, but must answer all questions honestly.

1. Does your family do anything together that is fun?
2. If you could be any age, what age would you be?
3. Did you go on a vacation this year? If you could go anywhere in the world you wanted to next year, where would you go?
4. What is something you have done about an environmental issue that you are proud of?
5. Do you feel that the energy shortage was contrived to push up the price of gasoline?
6. Do you like to take long walks? What place do you like to walk to the most?
7. Is there anything special about family means at your home?
8. How do you spend your time after school?
9. Of all the things you do in your free time, what do you like the most?
10. Have you a hobby which takes up a lot of your time? What is it?
11. What celebrity would you like for a friend?
12. Did you ever run away from home as a child? Did you ever want to?

13. Do you do things spontaneously, or do you think things through before doing anything?
14. Do you ever do things just because others expect you to do them that way?

V. RESOURCES

Books:

Environmental Quality: The Second Annual Report of the Council on Environmental Quality, August, 1971, Superintendent of Documents, U.S.Government Printing Office, Washington, D. C. 20402, Stock No. 4111-0005, $ 2.00.

Dimensions for Charlotte-Mecklenburg -- What Should the Future Be? Dimensions for Charlotte Mecklenburg Executive Park, Charlotte, North Carolina.

Ring Up Your City, A Yellow Pages for Teachers.

Yellow Pages of Learning Resources, Resources Directory.

Comprehensive Plan, 1995, Charlotte-Mecklenburg, Mecklenburg Planning Commission, December, 1973.

Metrolina Atlas, Clay and Orr, University of North Carolina Press, 1972.

Fundamentals of Ecology, Odum, Eugene P., W. B.Saunders Company, 1971.

Environment and Man, Richard Wagner, W. W. Norton and Company, 1971.

Values Clarification, Simon, Howe, Kirschenbaum, Hart Publishing Company, Inc.,1972.

Urbanization and Environment, Physical Geography of the City, Detwyler and Marcus, Duxbury Press, 1972.

Design with Nature, M Harg, Ian L., Natural History Press, Garden City, New York, 1969.(Charlotte-Mecklenburg A.V.Department also has film).

The Last Landscape, W. H. Whyte, Doubleday, Garden City, New York, 1968.

A Sand County Almanac and Sketches Here and There, Aldo Leopold, Oxford Press, 1949.

Filmstrips: (Found at Nature Museum)

"Ecology and Man," Set III, McGraw

"Environment Changing Man's Values", GA

126 - Part I. "The Enemy is Us."

127 - Part II. "Remaking the Patterns."

"Ecology: Understanding the Crisis," (with recording)

132 - " Environments and Ecosystems."

133 - " Man in Ecosystems."

134 - " Human Communities, Simple and Complex."

135 - " Creating Imbalance."

136 - " Destroying the Future."

137 - " Creating the Future."

"America's Urban Crisis, " Group I, SVE, (with recording)

1 - "The Roots of our Urban Problems."

2 - "The Air Pollution Menace."

3 - "Water Pollution - A Complex Problem."

4 - " Solid Waste -- A New Pollutant."

5 - "The Transportation Crisis."

6 - "The Housing Crisis."

Slide Programs:

"The State of the Environment," Olypus.

" Solutions to Environmental Problems," Olypus.

Films:
"Multiplying and Subdue the Earth," Par I and II, NET, color, 70 min., jr./sr.
"Urban Sprawl Versus Planned Growth," 22 min.
Games:
"Fox City," North Carolina Department of Administration.
"Man in His Environment," Coca Cola Company.
"Klug," of doubtful use on high school level.

METROLINA MINERALS

Wise Resource Use

I. INTRODUCTION

North Carolina has a large potential mineral wealth, and over 300 varieties of rocks and minerals have been identified. Of these more than 70 have been produced in commercial amounts. Although mining is not generally recognized as one of North Carolina's major industries, mining and quarrying are an important segment of the economy and one which has experienced significant growth during the past 25 years.

Metrolina, twelve counties within a 50 mile radius of Charlotte, lies in the richest mineral belt in North Carolina. One of the most important products is granite used for concrete and road building, and at present North Carolina produces more brick than any other state.

Natural rounded gravel is very limited in Metrolina, and granite is quarried in Rowan, Mecklenburg, Gaston, Lincoln, Cabarrus, and Iredell counties for use as "gravel."

Gold is certainly the most "oft discussed" mineral resource in Metrolina. The Rudisil Mine near the intersection of Trade and Tryon produced over $ 1,000,000 in gold between 1830 and 1939. 577,000 oz. of gold have been recorded as having been mined in the twelve counties called Metrolina.

The largest money-maker at present is Lithium, which is mined from pegmatite deposites in Cleveland and Gaston counties. These quarries also produce feldspar and mica as by-products. Also associated with these mines are tin and beryllium ores, but the technology for separating these ores does not allow economic mining of these ores.

Commercial deposits of high-alumina minerals (which contain more than 50 percent aluminum), are found at Henry Knob in York county, and on Crowder's Mountain.

North Carolina is the number one producer of feldspar is produced as a by-product of the pegmatite mining in Cleveland and York counties.

II. BEHAVIORAL OBJECTIVES

After completing this encounter, the student should be able to:

1. Identify the 4 major geological belts of Metrolina.
2. Name 5 or 6 rock formations found in the immediate area.
3. Identify several products made from local minerals.
4. Identify and describe 3 types of mining methods used in the area.
5. Recognize at least one area that is being abused in Metrolina.
6. Name 3 or 4 by-products that could be reclaimed by recycling wastes, such as aluminum, from fly ash released by the steam generation process.
7. List 3 reasons why minerals should be conserved.
8. Actively become involved in promoting conservation of Metrolina's resources.

III. ACTIVITIES

1. Study the geological make-up of Metrolina.
2. On a map of the Metrolina Region locate mineral resources, including both depleted and present supplies.
3. Collect and display samples of ores and products made from these ores.
4. Take a field trip to:
   a. Inspect present mining and/or quarrying operations.
   b. Investigate controversial private mining vs. park land areas such as Crowder's Mountain.
5. Slide projects: Make slides of abusive practices to collect visual records for comparison at present and future dates.

6. Research local wastes that contain reusable minerals and the extent of recycling by-products from local processes.
7. Determine what conservation plans have already been undertaken and proposed by the Charlotte/Mecklenburg Planning Commission.
8. Write letters to Centrolina Council of Governments proposing conservation of Metrolina's mineral resources.

IV. VALUES CLARIFICATION STRATEGIES

A. Continuum:
Determine students' stand on mining operations vs public park use of land at the site on the field trip.

B. Rank Order:
List 10 manufactured products from resources mined in this area. Arrange each in order of importance to student in maintaining each - life style.

C. Role Playing:
Kyanite is used widely as an insulating substance, particularly in the walls of ovens used in the manufacture of ceramics.
Crowder's Mountain has a rich supply of this material, which is obtained by strip mining. Conservations, by influence on state legislators, have managed to stop strip mining and set Crowder's Mountain aside as a state park.
The Web: Crowder's Mountain --kyanite, insulators, ovens, ceramics.
Players: President: Dirt Daubers Association (ceramic products wholesaler)
Owner: Central Avenue Ceramics and Gift Shop
President: Strip Mining Corporation, Crowder's Mountain.

D. Alligator River:
Once upon a time there was a real estate dealer named Steele, who learned that some marshland he and his partner owned might be condemned for a landfill, so he quickly swapped it to an unsuspecting buyer for a mountain tract which proved later to contain minerals. He then leased the land to a mining company who employed many of the local people. One of those employed was John Smith, father of twelve.
Everything went fine and the community welcomed the new industry until Bob and Betsy Goodall noticed that the local lake no longer had good fishing or clear water for swimming. Upon investigation they discovered much silting and pollutants that could be traced directly to the mining operation. Since the Goodall's had been drawn to the area by the uniqueness of the plant and animal life and the recreational opportunities, they were appalled at the rapid disappearance.
By instigating an active local, regional, and state environmental alert, they pressured representative Fox (the silent partner in the mine) to close down the mine until an Environmental Impact Statement could be made. Mr. Deal, the mine operator and engineer, immediately asked for the job. John Smith, now out of work, applied for welfare funds to help feed his twelve children, but Betsy Goodall, a social welfare worker, blocked the application since she had failed earlier to persuade the Smiths to stop having a baby a year. When the Smith's failed to pay their rent, Mr. Steele evicted them. When John asked Bob Goodall to let him stay temporarily in one of the empty houses, Bob said he couldn't afford to because none of the occupants were paying their rent since they, too, had been laid off by closing down mine operations.
John appealed to Rep. Fox, who immediately took the following action:
1. Blamed Bob and Betsy Goodall for the Smith's sick and hungry children.

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2. Made a deal with Mr. Steele in which he reopened the mine on the basis of a questionable Environmental Impact statement by Mr. Deal.
3. Allowed the state to buy 25 acres of mountain land which couldn't be mined in order to establish a state park.
4. Received 49% of the returns on the sale of the land to the state.
5. Called in reporters and did a "Sunday special" on the reinstatement of the Smith Family and the great employment opportunities in the area.

List each of the characters in order of how "villanous" he is to you.

V. RESOURCES

Books and Pamphlets:

Metrolina Atlas, Clay, Orr, University of North Carolina Press, 1972.
Field Guide to Environmental Education, Environmental Education Center Charlotte-Mecklenburg Schools, pp. 69-73.
Comprehensive Plan 1995, Charlotte-Mecklenburg Planning Commission.
Dimensions for Charlotte-Mecklenburg, Charlotte-Mecklenburg Planning Commission.
The Mineral Industry of North Carolina. (see below)*
A Proposed Program for the Regulation of Mining in North Carolina, North Carolina Department of Natural and Economic Resources, P. O. Box 27687, Raleigh, North Carolina, 27611.
A Directory of Principal Mineral Producers of North Carolina.
List of Publications of the Division of Mineral Resources.
An Introduction to the Topography, Geology, and Mineral Resources of North Carolina.
House Bill 650, The Mining Act of 1971.
The Story of the Geologic Making of North Carolina.
Geology Field Trip - Mecklenburg and Gaston Counties.
* Superintendent of Documents, U.S.Government Printing Office, Washington, D. C., 20403, 10 cents.

Filmstrips:

Using Natural Resources,(Environmental Education Center, Nature Museum) color.
109 The Demand
110 The Supply
111 Balancing the Supply and Demand
Science and Natural Resources (D)
112 Can the Biologist Meet the Demand?
113 Can the Chemist Renew the Supply?
114 Can the Physicist-Engineer Strike a Balance?

Films:

Problems of Conservation: Our Natural Resources,EBEC, color, 11 min.(J-S)

Games:

"Recycling Resources," (6-9), Creative Teaching.
"The Redwood Forest" - Prentice-Hall.

PRESERVATION:
Man's Environmental Attitudes

I. INTRODUCTION

American attitudes toward the environment are reflected in our own American history. The earliest European settlers found a country which appeared to have unlimited resources. Early settlers often used the boundless resources indiscriminately and wastefully.

Colonial days were days of large land owners, including George Washington and soil from his fields likely washed into the Potomac River. Contour plowing, to prevent soil erosion, was suggested by Thomas Jefferson.

In the 19th century, Henry David Thoreau voiced his indignation and concern about man's destruction of nature and the values of the society in Walden or Life in the Woods. He wanted for a society which would "create" wilderness areas where wild life would be protected. John J. Audubon aroused interest in wildlife as well - - particularly birds - - with his paintings.

National concern for the vanishing American frontier, resulted in legislation which designated Yellowstone National Park in 1872. Thirty national parks have been thusly created by the 1960's, with national park lands totallying 13.5 million acres.

But American attitudes were not of one mind in the late 19th century and early 20th century. While some favored preservation of America's vanishing natural areas, others felt forests should be cut, and ores should be mined without restraint. Such activity, it was said, brought employment and progress. America's resources were to be used for the good of the country.

In 1892, President Grover Cleveland put 21 million acres into the forest reserve system -- under the Federal Reserve Act of 1891 - - an act which was passed against business opposition and public apathy. President Roosevelt put more acres into the national forest system - - 64 million acres- - than any other president.

World War I -- demanding quantities of natural resources as never before--including petroleum, and the increasing prosperity of 1920's ended in economic and environmental disaster! Worn out, and over-used soil, compounded by drought conditions, turned parts of this countryinto a "dust bowl," and brought us in a new area of environmental management by the federal government. Franklin D.Roosevelt and Congress established the Tennessee Valley Authority to protect and develop the Tennessee River Valley and the Civilian Conservation Corps was organized. In 1936, the first federal policy on flood control was established by the Flood Control Act. Conservation -- or management of resources by the federal government-- was born out of disaster in the 1930's.

World War II began the greatest surge of resource consumption experienced by this, or any other country. Nearly 93 million tons of high-grade ore were mined in 1944 alone, and the rich ore deposits of the upper Great Lakes region were so overworked that incresingly, the United States has had to seek mineral resources abroad. Since World War II the consumption of petroleum and other resources has continued to soar.

In the 1960's the federal government again responded -- with the Water Quality Act in 1965, the Clean Rivers Restoration Act in 1966, and the Air Quality Act in 1967. The President's Council on Environmental Quality was established in 1969, and in 1970, the Environmental Protection Agency was created. This time the legislation was oriented toward environmental clean-up rather than resource management.

II. BEHAVIORAL OBJECTIVES

1. List and explain 3 recent laws that indicate a trend returning to environmental quality indicative of colonial times.
2. Outline the trend in conservation from George Washington to the present.
3. List 2 animals that have become extinct and 10 that have been endangered.

III. ACTIVITIES

1. Present and follow-up the two-part sound filmstrip, "Environment: Changing Man's Values."
2. On a map of the United States, show the main water systems and the types of land surfaces.
3. On a map (use symbols) show the natural resources such as minerals, animals and national parks.
4. List and explain laws passed to protect our environment.
5. Write 5 biographies of men who have advocated conservation.
6. Explain how animals have been treated and what is being done about this.
7. Write a composition about how man has used and abused his environment in the United States.
8. Pretend you are a newspaper reporter and write an item about a natural disaster or a conflict between business and environmental control.
9. Make a poster depicting some type of pollution.
10. Have a field trip to see the pollution in the community.
11. Find out what our community is doing about pollution. Have a speaker to talk to the class about this.

IV. VALUES CLARIFICATION

A. Debate:

Conservation is a method used to help with an immediate shortage of resources

or

Conservation is the thoughtful planning necessary to preserve the resources for future generations.

B. Taking a Stand

Have the class select a controversial subject. Each student should write a slogan about the subject and make a poster using the slogan. A demonstration may be held by the students walking around the room carrying their posters. The posters are then taped to the walls of the classroom. The students may write letters-to-the-editor, or may write to their congressman, a member of the County Commissioners, or the mayor of the city. In these letters, the students should express their stand; the reasons for the stand.

C. Alternative Action Search

Each student is to write out briefly what he would do in a given situation. These situations may be discussed in groups to decide which of the solutions would be most desirable. The discussion then may include the whole class. Sample situations:

1. You are walking behind someone. You see him take out a piece of chewing gum and drop the wrapping to the sidewalk. You are twenty feet behind him. Ideally, what would you do?
2. You are to shop for your mother. She has just decorated her bathroom and kitchen. She has used yellow and green in the kitchen and pink and grey in the bathroom. It is beautiful, and everything matches. You are to buy paper towels, paper napkins, toilet tissue.

and facial tissue. Mother would like to carry out her motif in the newly-decorated rooms with these items. Since you know that the dye used in these products help cause pollution, you know white is best for our environment. What would you do?

3. The class is going on a picnic. You are to purchase the soft drinks to take on the picnic. Are you going to buy the sodas in disposable bottles or reusable bottles?

V. RESOURCES

Books

Ecology: Man's Relationship to His Environment, Lawrence J. Pauline, and Howard Weishaus, Oxford Book Company, Inc., 1971.

North Carolina's Work in Environmental Protection, Robert W. Scott, Carolina Symposium, 1970.

People and Their Environment, Social Studies, 7, 8, 9, Matthew J. Brennan, Editor, J. G. Ferguson Publishing Company, 1969.

People and Their Environment, Social Studies, 10, 11, 12, Matthew J. Brennan, Editor, J. G. Ferguson Publishing Company, 1969.

Filmstrips:

"Environment Changing Man's Values," Park I. Enemy vs. US, Park II, "Remaking the Patterns," Guidance Associates.

"Learning About Conservation," Coronet Films.

"Conservation for Today's America," SVE.

Games:

"Ecology, The Game of Men and Nature," Urban Systems, Inc.

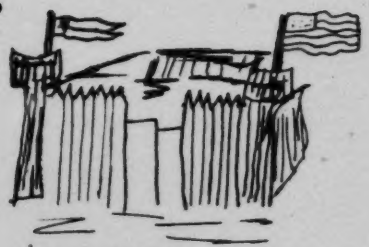
"E E G -- The Energy-Environment Game, 7-12," Creative Studies, Inc.

"The Total Environment," Steck-Vaughn Company.

"Our Environment Problem or Promise," Nystrom.

SETTLEMENTS:

Effect of Environment



I. INTRODUCTION

"Our every act -- eating, sleeping, breathing -- is a ceremony re-affirming our dependence on M ther Earth and our kindship with her every child". Gayle High Pine (in Akwesasne Notes)

When European settlers began to colonize this country, there were approximately one million native Americans living on the land -- as many, some have speculated, as the land would sustain given their lifestyle. Early settlers came to this country from crowded lands, with physical settings shaped by thousands of years of occupancy. Finding a land of superabundance, they were eager for growth and natural resources were used lavishly. While pioneers and developers weren's aware of the spoilage, they unwittingly fostered the idea, still held today, that resources could be used with abandon, as there was always a new frontier -- with unlimited resources -- an attitude often referred to as a frontier philosphy.

II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

At the conclusion of a successful encounter, the student should be able to:

1. Demonstrate an understanding of the different ways of life or cultures developed in the different sections of the United States by comparing the culture of Spanish colonies and English colonies or the ways of life in the Southern colonies and the New England colonies in the British colonies.
2. Explain several reasons why the colonists came to the New World and the influence this had on the culture which developed in the United States.
3. Describe the role environment played in the development of the way of life in the United States.
4. Discuss 3 geographical reasons why man settled in any particular area.

B. Activities·

1. On a map show the types of land surfaces and main waterways.
2. Make a chart listing the European settlement, who settled there, a description of the location, when settled, type of government, language used, and the religion of the people.
3. Make a list of words that we use today that came from these European countries and from the Indian language.
4. Explain how the environment influenced the development of different occupations, of different housing, of different types of government, of different kinds of labor, and of different kinds of entertainment.
5. The class may be divided into groups to do research and reports on each country settling in the New World, and their colonies there. Each group would present these to the rest of the class in an interesting manner. This could be done in the form of a play or role playing.
6. A sample of foods from the different countries or sections of the United States used by the colonists may be served to the students.
7. Illustrate the tools used in the everyday life of the colonists. Compare those tools in use in different areas.
8. Explain how the United States Government evolved from the British government.

9. Illustrate and explain the differences between the colonists and the Indians' ways of life.
10. Explain how different settlements used the natural resources.
11. Explain the effect that the mercantilist theory had on colonial development.
12. Explain how the white man changed the environment of the New World when he came here.

III. VALUES CLARIFICATION

A. Role Playing:

1. Pretend that you are one of the people who settled in what is the United States. The student might use this format:
   a. I am a _____. I came to the New World to _____ _____. I settled in the region because _____.

B. Composition:

1. Pretend you are a French trapper and write a story concerning your feelings about the natural resources in the New World and how you live using them.
2. Pretend that you are a Spanish conquistador and write a story about how you feel about the natural resources in the New World and how you live.

C. How would your life be different:

How would your life be different if one of the other countries had gained control of the United States instead of England?

IV. RESOURCES

Books:

American Heritage Junior Library, Vol. I, Discoverers of the New World, editors of "American Heritage, The Magazine of History," American Heritage Publishing Co., Inc., New York, 1960.

Colonial America, Oscar Theodore Barck, Jr. and Hugh Talmage Lefler, The Macmillan Company, New York, 1958.

Colonial America from the First Settlement to the Close of the American Revolution, Editors of the Album of American History, Vol. I, Charles Scribner and Sons, New York, 1971.

Encyclopedia of American History, Editor Richard B. Morris, Harper and Row, New York, 1970.

Everyday Things in American Life, 1607-1776, William Chauncey Langdon, Charles Scribner and Sons, New York, 1965.

Life in Colonial America, Elizabeth George Speare, Random House, New York, 1963.

The Life History of the United States, Vol. I, Prehistory to 1774, The New World, Richard B. Norris, and the Editors of Life, Time, Inc., New York, 1963.

Filmstrips:

"French Colonization (Settling the New World)," Encyclopedia Britannica Films, Inc.

"English Expansion," Filmstrip House.

"Discovery, Exploration and Colonization of America," Sound Filmstrip presentation.

"Spanish Explorers," McGraw-Hill Book Co.

"France in the New World," McGraw-Hill Book Co.

"Life in New Amsterdam," Encyclopedia Britannica Film, Inc.

"Life in Old Santa Fe," Encyclopedia Britannica Film, Inc.

"Life in Early America," Encyclopedia Britannica Film, Inc.

"Our Natural Resources," Filmstrip House.

"Before the White Man," McGraw-Hill Book Co.

Many other films and filmstrips exist this is a short representative list.

WESTWARD MOVEMENT:

Who Owns the Land?

I. INTRODUCTION

The history of this country cannot be told without discussing American choices concerning the use of the land. European patterns of land and attitudes toward the land's resources differed from those of the native Americans, the Indians. Much of our early history can be retold in terms of conflicts in cultural values regarding the use of the land. Indians valued their place in nature and sought harmony with natural forces. Land belonged to all - - and was to be used for the benefit of all. Early Americans on the other hand, came to this land from crowded countries. Finding, here, what appeared to be a land of super abundance, they were eager for growth, and land and resources were used lavishly, often wastefully.

The European settler saw land in terms of private property - - his own farm, his own profit. The land was to be utilized for his own gain, to do this it became necessary to "conquer nature " to control the elements. The results of the conflict between the Indian "land ethic" and the American "growth ethic" are recorded in history. Ultimately, the values of the pioneer settler prevailed, shaping, not only the face of America's land, but the attitudes of Americans to the present day. According to historian Frederick Jackson Turner, the frontier was the most important factor in the development of ideas of individualism, economic equality, and democracy. While many historians discount Turner's emphasis on the frontier as the sole force behind these ideas, most agree that it was certainly a significant aspect of American development. An understanding of the frontier experience is an important part of American history, and as such, is an essential part of American history courses.

In view of the crucial issues which face us today in planning for future use and conservation of America's land resources, it is important that individuals realize that it is values which play a large role in determining the choices which will be made in planning the use of land. As future citizens, decision makers and planners, students should investigate the impact their own values might have upon future national land policies.

The following activities and values clarification strategies are designed to accomplish the general goal outlined above. They might be used in a variety of ways. Some activities might be done by the whole class - - others would work well as small group or individual study topics. Grade levels and abilities would also have to be considered. It might be useful to use values clarification as both an introduction and a conclusion to reflect changes. A concluding discussion might be needed to help students reflect on the impact of values they have expressed.

II. BEHAVIORAL OBJECTIVES

At the conclusion of the encounter, the student should be able:

1. To demonstrate through written test responses a basic factual knowledge of the westward movement in American history.
2. To explain orally the basic land ethic of the Indians and how this contrasted with the settlers land ethic.
3. To demonstrate through class discussion and written response an understanding that one's choices regarding land use are part of one's value system.
4. To publicly affirm their own personal values regarding the use of our nation's land.
5. To reflect upon what impact their own values will have upon the future use of the land.

III. ACTIVITIES

1. Readings for discussion: (see list of Resources). These may be done by the whole class or by smaller groups. The purpose of the readings should be to familiarize students with the factual background. After reviewing the facts the students should formulate an answer to the questions"
    a. How did the Indians view land and its value to them? (At some point an evaluation of factual and background knowledge should take place.)
2. Write essays on the above topics using the same suggested readings as source materials.
3. Stage a debate between Tecumseh and General William Henry Harrison on the topic: Resolved: That treaties negotiated by the Indian tribes for the sale of their land are valid and should be enforced as law.
4. Stage a mock courtroom trial concerning the question of whether or not the Cherokee Indians were entitled to federal protection of their Georgia land.
5. Independent research and study projects:
    a. Andrew Jackson as the ideal frontier hero.
    b. The changing "land ethic" of the Cherokees: An attempt at survival.
    c. The impact of Andrew Jackson's fiscal policies upon land use.
    d. Jefferson values regarding land and the policies which resulted.
    e. The impact of the railroad on the Plains Indians (note especially: the effect on the buffalo herds.)
    f. Select an Indian tribe and learn something about their way of life. Report on how their culture related to their encironment and on their feelings regarding land and property.
    g. Make models of various craft items used by the Indians and explain how they used the resources of their environment in these objects.
    h. Construct a model sod house and display various items used by the western farmers in the Great Plains. Explain their use of the land. How does this compare to the Indians' use of these areas?
    i. Map the annual rainfall of the United States -- locate the Great Plains and explain how it differs from other places. Which United States land seems best suited for farming? For other uses?
    j. Graph the record of public land use during the 19th century. On the same sheet make a time line of major historical events of the same time period. Explain and evaluate the graph in terms of these events. (Students may do one or several of these using various figures.)
6. Show the film, "The Dust Bowl." Discuss how this relates to the frontier history. What was the result of the settler's land ethic? How do the statements of these farms reveal a change in their values toward the land?
7. Comparative Map Study: Using the land use maps (page 202, The American Experience), and a map showing the location of major Indian tribes of the United States using various sources, try to determine how the Indians use of the land compared to the use shown on the ma How do you account for similarities and differences?

8. Field Trip: Visit James K. Polk's birthplace in Pineville. From readings and exhibits in the museum, have students outline the basic policy of the Polk administration regarding territorial expansion. Follow this with a classroom discussion and the meaning of Manifest Destiny.
9. Active involvement in a contemporary problem. Select some area, for example Joyce Kilmer Memorial Forest, which has been a center of controversy regarding public land use policy. As a culminating activity, students might wish to decide how they feel about the issue, take a stand and take some action (write the newspaper, send your Congressman a petition, etc.).

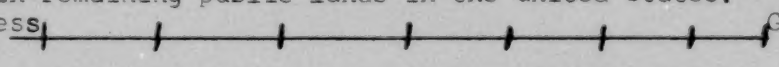
IV. VALUES CLARIFICATION STRATEGIES

A. Rank Order:

1. On a free Saturday where would you rather spend your time?
   a. walking in the woods
   b. at the beach
   c. at a shopping center
2. There is a heavily wooded vacant lot in your neighborhood. Would you rather - -
   a. have a new house built there?
   b. have it partially cleared and nicely landscaped as a small mini-park?
   c. leave it as it is - - a mini-wilderness?
3. The government has several million acres of good farm land available in Alaska. What should be done:
   a. make it available at low prices or free and aid poor urban families to "pioneer" and get a new start in life.
   b. do nothing with it
   c. develop the most scenic parts as a national park and sell the rest at the most profitable price they can get.

B. Continuum:

1. Rate yourself along the line based on what you feel should be done with remaining public lands in the United States.



Wilderness Willie would have all such lands left as they are with no further use at all -- not even for camping or hiking. Growing Gloria is concerned primarily with economic growth and development. She would renew the homestead program as well as encourage mining, forestry, etc., on all public lands.

2. Resent-Demand-Appreciate (with a bit of role-playing.) You are the head of the Federal Bureau of Land Management and are trying to decide on a plan for a large tract of unused public lands. It is good land, well-forested, with good soil -- and could be used for a wide variety of things. Fold a paper into four, long vertical columns. In the first, list approximately 10 possible uses for the land. In the second column, for at least 3 of the uses on your list, write a statement that expresses something a person or group might resent about this use. In the third column, write a demand for each of these resentments. (For example: you may suggest using the land for farming - -the resentment might be, "I resent the farms because all the trees will be cut down." The demand: " I demand that a national forest be created to regulate use of the trees.") In the last column, write a statement expressing what someone might appreciate about the use of the land. (For example: good farms would increase production and lower food prices.)

3. Three Characters.
If you could not be yourself, but you could be someone else, what is the name of the character you would most like to be? (chosen from real life, fiction, news, history, etc.) Next write down the character you would least like to be and third, the name of the character who is most like you. Then break up into small groups to share lists and explain your choices.
Follow this with a group discussion including some clarifying questions from the teacher. How many of you chose men? How many women? How many chose self-made people? Rugged outdoor types, etc. Hopefully, this exercise will reveal the impact of the "ideal frontier hero" on the American Value System.

V. RESOURCES

Books:

Senior High - -

Madgic and Seaberg et. al. The American Experience, Addision-Wesley, Menlo Park, California. (Chapter 7: "The Frontier: Expansion's Impact on American Development"), (or any good basic text).

Udall, Stuart, The Quiet Crisis, Avon Books, New York. (Chapters 1 and 2 -- excellent on the subject of the land ethic).

DeLoria, Vine, and Wise, Jennings, The Red Man in the New World Drama, McMillan Publishing, Riverside, New Jersey.

Brown, Dee, Bury My Heart at Wounded Knee, Bantam Press, New York.

Armstrong, Virginia, I Have Spoken, Pocket Books, New York, --pp 50-51, 78-79, 167-168, 98-99. (These are suggested but there are many good expressions here of the Indians' feelings about the land.)

The Cherokee Removal (Focus Series, Franklin Watts, Inc., New York, (also suitable for junior high.)

McHarg, Ian, Design with Nature, Natural History Press, Garden City, New York.

Junior High - -

Basic texts - - chapters on westward movement.

Baldwin, Gordon C., How Indians Really Lived, G.P.Putnam's Sons, N.Y.

Baity, Elizabeth Chesley, Americans Before Columbus, Viking Press, N.Y.

Tunis, Edwin, Indians, The World Publishing Company, Cleveland.

Leavitt, Jerome, America and Its Indians, The National Geographic Society, Washington,D. C.

Silverberg, Robert, Home of the Red Man, New York Graphic Society, Greenwich, Connecticut.

American Heritage Junior Library, Indians of the Plains, Harper and Row, New York.

Bleeker, Sonia, The Apache Indians, William Morrow Company, New York

Bleeker, Sonia, The Aztecs, William Morrow Company, New York

Bleeker, Sonia, The Cherokees, William Morrow Company, New York

Bleeker, Sonia, The Chippewa Indians, William Morrow Company, New York

Bleeker, Sonia, The Crow Indians, William Morrow Company, New York

Bleeker, Sonia, The Delaware Indians, William Morrow Company, New York

Bleeker, Sonia, The Maya, William Morrow Company, New York

Bleeker, Sonia, Horsemen of the Western Plateaus, William Morrow Company, New York

Bleeker, Sonia, Indians of the Longhouse, William Morrow Company, New York

Bleeker, Sonia, The Navaho, William Morrow Company, New York

Bleeker, Sonia, The Pueblo Indians, William Morrow Company, New York

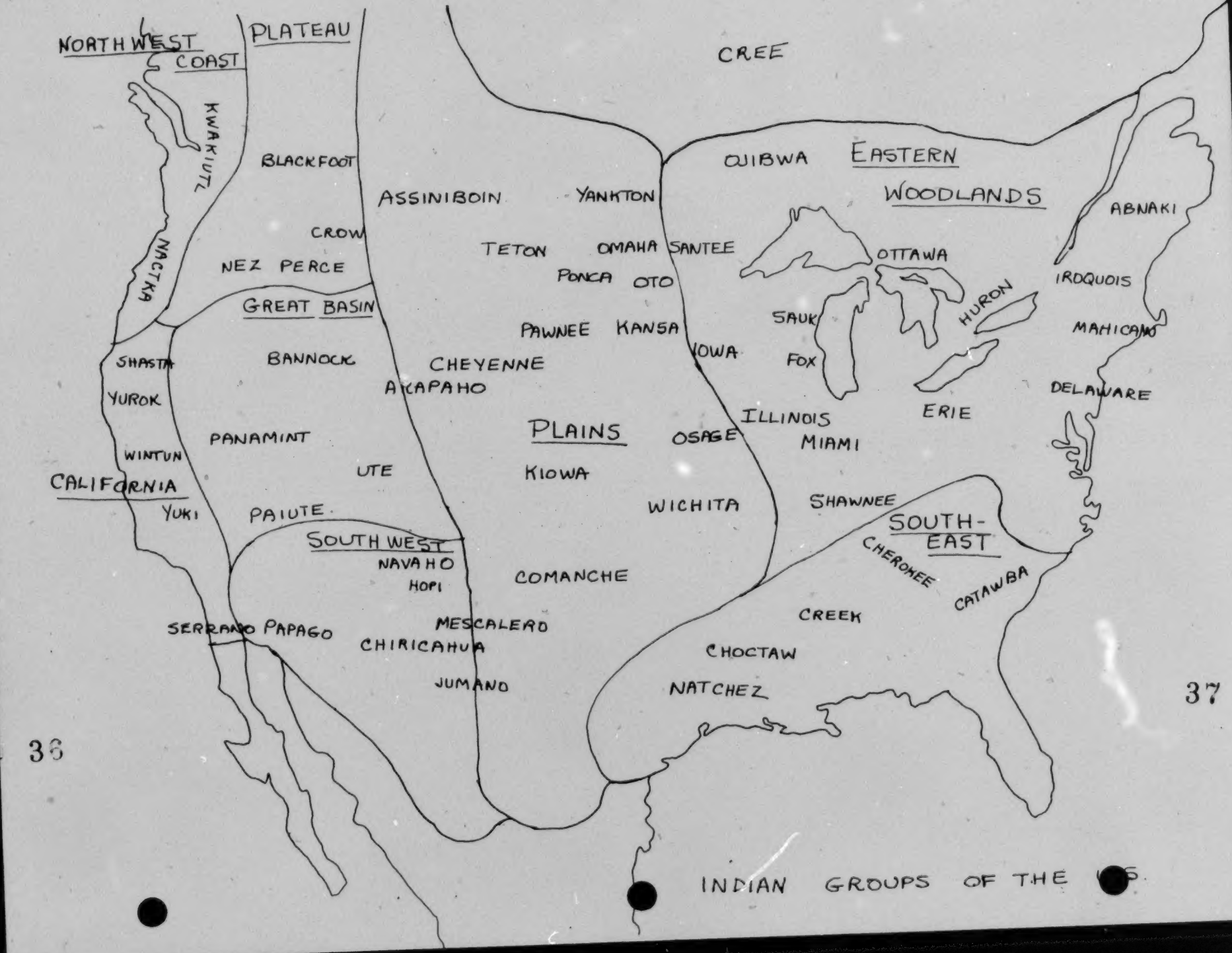
Bleeker, Sonia, The Seminole Indians, William Morrow Company, New York

Bleeker, Sonia, The Sioux Indians, William Morrow Company, New York

Bleeker, Sonia, The Mission Indians of California, William Morrow Company, New York

Films: (available from Charlotte-Mecklenburg Schools)
"The Dust Bowl," McGraw-Hill
"The Real West," McGraw-Hill
"Multiply and Subdue the Earth," Indiana University
Filmstrips:
"Westward Migration," SVE (Singer.)
"Pathfinders Westward, SVE, (Singer.)
"The American Indian: A People Dispossessed," Guidance Associates.
"Land Conservation Today," SVE.
Maps:
Source: The American Experience.
p. 191, Indian Cessions - 1750 - 1850
Indian Cessions - 1851 - 1890
p. 202, Land Use - - 1860
Land Use Early 1900's
Indian Tribes (attached)
Facts and Figures: (source: Historical Statistics of the United States, Department of Commerce, Bureau of the Census.)
I. NUMBER OF HOMESTEAD ENTRIES (not including those on ceded Indian lands).

1863	8,223	1871	39,768
1864	9,405	1872	38,742
1865	8,924	1873	31,561
1866	15,355	1874	29,116
1867	16,957	1875	20,668
1868	23,746	1876	25,104
1869	25,628	1877	18,675
1870	33,972	1878	35,630
1879	41,005	1889	42,183
1880	47,293	1890	40,244
1881	36,999	1891	37,602
1882	45,331	1892	55,113
1883	56,565	1893	48,436
1884	54,982	1894	56,632
1885	60,877	1895	37,336
1886	61,638	1896	36,548
1887	52,028	1897	33,250
1888	46,236	1898	44,980


NORTH WEST COAST
PLATEAU
CREE
KWAKIUTL
BLACKFOOT
ASSINIBOIN
YANKTON
OJIBWA
EASTERN WOODLANDS
ABNAKI
CROW
TETON
OMAHA
SANTEE
OTTAWA
NEZ PERCE
NACTKA
PONCA
OTO
IROQUOIS
GREAT BASIN
SAUK
HURON
PAWNEE
KANSA
IOWA
MAHICANO
SHASTA
BANNOCK
CHEYENNE
FOX
ARAPAHO
DELAWARE
YUROK
ILLINOIS
ERIE
PLAINS
OSAGE
PANAMINT
MIAMI
WINTUN
UTE
KIOWA
CALIFORNIA
WICHITA
SHAWNEE
YUKI
PAIUTE
SOUTH-EAST
SOUTH WEST
CHEROKEE
NAVAHO
COMANCHE
HOPI
CATAWBA
CREEK
SERRANO
PAPAGO
MESCALERO
CHIRICAHUA
CHOCTAW
JUMANO
NATCHEZ
INDIAN GROUPS OF THE U.S.

ENERGY

ECONOMY vs ECOLOGY

I. INTRODUCTION

Since man first harnessed energy he has found new and elaborate ways to consume it. In the year 1973, many Americans were shocked and dismayed to find that their nation of plenty was running short of energy. People were asked to turn their home thermostats down; businesses were asked to turn off unnecessary lights; street lighting was reduced; long lines formed at gas stations; even Christmas was included in the energy cut-back; people were asked not to burn Christmas tree lights! During all of this time Americans kept asking, "How did this happen? Where is all of our energy?" Many have grumbled that it was a trick contrived by oil producers to drive up the price of oil and derivative products. But one indisputable result of the "energy crisis" was that our present supply of fossil energy is not infinite.

Most of man's energy comes from the sun. The fossil fuels---coal, oil, and natural gas are products of dead decayed plants, which captured the sun's energy through the process called photosynthesis, and animals. Since the industrial revolution, man's energy consumption has risen steadily. Between 1950 and 1970, consumption of energy resources doubled in the United States, with an average growth rate of 3.5 percent --more than twice the population growth rate. For all their energy needs, 800 million Chinese people consume the same amount of energy that Americans do for air conditioning alone. In the United States, our energy consumption is distributed in the following way: 25% transportation; 11% residential; 42% industrial, and 14% business.

Young Americans are now faced with a problem of phenomenal proportions. Reduced to its simplest terms it is Economy vs. Ecology. The question has become a choice between the power-consuming luxuries that we now have or cut-back and conservation to ensure an environment in which we can live without fear of running out of power -- or without fear of rendering the environment intolerable.

II. BEHAVORIAL OBJECTIVES

At the end of the encounter, the students will be able to:

1. Explain the sources of different types of energy used in their lives.
2. Discuss advantages and disadvantages of using electricity or fossil fuels.
3. Describe the difference between renewable and non-renewable resources.
4. Discuss wasteful uses of energy.
5. Suggest and practice methods of conservation.

III. ACTIVITIES

1. Make a study of the formation of fossil fuels. How are they mined? Write to large oil companies and ask them how they are increasing their yield, what impact their fields have on the environment, etc.
2. Have students make a survey of the electrical appliances in their home and school. Could other fuels be substituted to power them? Could school courses using electrical appliances be revised so that power consumption would be reduced?

3. Study how electricity is produced. Visit a power plant. What is the difference between a fossil fuel plant, a hydroelectric plant, and nuclear plant.
4. Research the effects each type of power plant has on the environment. Include contaminants introduced to the air, water, and soil.
5. Put on a "save energy" campaign at the school. Have students compose and illustrate "catchy" slogans which will encourage others to save energy. (Under a light switch you might put "Turn lights off - Thanks a Watt!")
6. Study alternative sources for electrical energy. Have students collect articles about such alternatives as geothermal energy, wind power, solar energy, and burning wastes. Discuss the difference between renewable and non-renewable resources.
7. Study the various types of insulation for buildings. How do they affect heating and cooling?
8. Have students stand on a street corner and record the number of powered vehicles that pass. How many people were in each?
9. Make a study of the proposed mass transit system in Charlotte. How would it affect energy consumption? The environment?
10. Using the information from consumers' guides, find out which types of refrigerators, freezers, air conditioners, etc., used less electricity.
11. Write your United States senators and congressmen and ask them what bills have been introduced that apply to energy use. What recent laws have come into effect?

IV. VALUES CLARIFICATION STRATEGIES

A. Baker's Dozen:

List 13 electrical appliances at your home that you use. Mark out 3 things that you can live without forever because the government is running a collection drive for them. Circle 3 things that you consider essential because you are the lucky winner of the TRIP TO MARS contest and you leave today. Volunteers should read their lists.

B. Values Voting:

By raising or lowering their hand with emotion, students should indicate the degree that they agree or disagree with the following: How many of you would ride the bus to a movie instead of going in a car? How many of you would ride your bike to the pool instead of a motorcycle? How many of you would do without TV for 3 days a week? How many of you would eat cold dinners on weekends to avoid turning on the stove? How many of you would give up the family car?

C. Devil's Advocate:

The teacher can give plausible reasons for allowing power plants to add pollution to the land, water, and air. (Be careful that the students do not accept your statements as true facts.) We are already exposed to alpha, beta and gamma radiation, why shouldn't we take a chance that a little leakage won't hurt us? The energy demands are rising steadily so pollution controls should be abandoned and high sulfur coal should be burned. Most people don't really care what is in the air they breathe or the water they drink, so why worry with keeping it clean--it costs too much

V. RESOURCES:

Films:

The Energy Challenge, Screen News Digest, Color, 26 min.
Energy: The Dilemma, Churchill, Color, 20 min.
Energy: Less is More, Churchill, Color, 18 min.
Energy: New Sources, Churchill, Color, 20 min.
Energy: Nuclear Alterations, Churchill, Color, 20 min.
Air Pollution -- Take A Deep and Deadly Breath, Parts I, II, III, ABC-TV, color, 18 min. for each part.

People and Business:

Mecklenburg County Environmental Health Department, Mr. T. W. Bivens, Director, phone 374-2620.
Carolinas Environmental Studies Group, Mrs. John Hall, Vice-President, phone 536-2481.
Metrolina Environmental Control Association (MECA), Mr. Roy Alexander, President, phone 535-2697.
Duke Power Company, Mrs. Angelina S. Howard, Supervisor of Public Information, phone 374-8138.
Mecklenburg County Planning Commission, Mr. Fred Bryant, Director of Current Planning.

Books and Pamphlets:

Nuclear Power and Environment --Questions and Answers, The American Nuclear Society, 1974.
Short Range Transit Needs -- Charlotte-Mecklenburg County Public Transportation Study, Wilber Smith and Associates.
The Energy Crisis, Mary Beth Durner, Madison County ESEA Title III Project, Dr. Larry Liggett, Director.
Man and the Ecosphere, Paul R. Ehrlich, W. H. Freeman.
Quest for Quality, conservation yearbook; The Third Wave, conservation yearbook number 3; It's your World, conservation yearbook number 5, U. S. Department of the Interior.

EUTROPHICATION:

How Lakes Die

I. INTRODUCTION

Charlotte's "lakes" and ponds, are filling and in a sense are growing old. The aging process is called "eutrophication." Eutrophication, from "eu", " good", and "troph", which means nourishment, is the gradual change of a body of water from a relatively clear, often deep, sparsely populated body of water to a shallow, warm, greatly enriched body of water.

"Eutrophication is a natural process caused by siltation and the deposition of organic materials (vegetation, animal bodies, fertilizers, detergents, etc.) Wastes increase the nutrient content of the water, and the excessive nutrients increase the growth of algae and other aquatic plants. A common sign of organic enrichment is "algae bloom," an excessive and unsightly growth or scum of floating blue-green algae and other organisms which are not used effectively as a food by small vertebrates. As increasing plant life flourishes it screens sunlight from lower layers and depletes oxygen during nighttime respiration. Decomposers, organisms which feed on dead organic material multiply, consuming the excessive organic materials, and depleting the supply of dissolved oxygen in the water. Results, in addition to the undecomposed wastes, can include malodorous dydrogen sulfide, methane, and ammonia, produced during the anaerobic decomposition process.

Eutrophication is normal, and the transition of a lake into a marsh, and swamp and eventually a wetland forest will take hundreds to thousands to tens of thousands of years, depending on the size of the lake and the types of nutrients which are carried into it each year.

Algae bloom is a problem in Freedom Park Lake. Beginning in the spring, most evident in the summer, and slacking off in the fall, the excessive indications of eutrophication are a cause for concern amond users of the park. Intensive studies have not been conducted on the lake, but overland runoff from highly fertilized lawns in residential areas surrounding Freedom Park likely increases the nutrient content each spring.

II. BEHAVORIAL OBJECTIVES

The student should be able to:

1. Ascertain the limits of the biophysical environment that directly affect the lake.
2. Identify the biotic and abiotic factors that are relevant to a "balanced" system.
3. Understand how data is collected by using various pieces of equipment and material.
4. Identify various pollutants in the lake, probable causes and how they can be eliminated.
5. Plan a course of action necessary for solving problems that exist.
6. Implement a plan of action.

III. ACTIVITIES

1. Secure a map of the lake.
2. Conduct a depth profile study of the lake.
3. Secure data to include:
   a) Abiotic water studies -- temperature, dissolved oxygen, carbon dioxide, hydrogen sulfide, phosphates, turbidity, pH, conductivity, hardness, and chlorides.
   b) Biotic water studies -- total suspended solids (TSS), bacteria cultures, micro- and macroscopic examinations.

c) Abiotic surface facts -- humidity, air temperature, wind direction, wind velocity, barometric pressure, rain fall, and soil tests.
d) Biotic surface facts -- observation and identification of animal life.

4. Photograph areas of concern.
5. Assimilate and study data.
6. Review and compare data collected previously.
7. Discuss problems that exist and possible solutions.
8. Write an evaluation of the study and suggested proposal.
9. Contact the proper authorities and present the proposal.

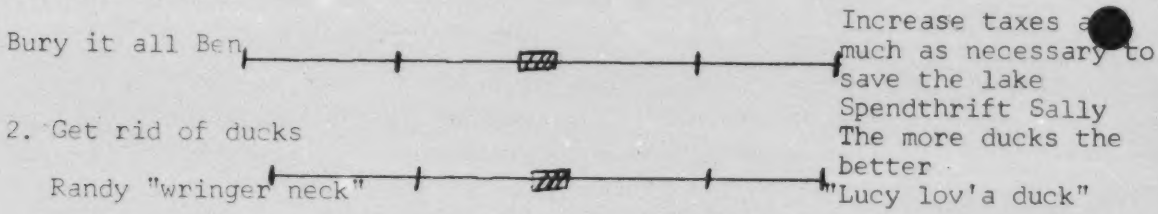
A. Data Collecting Format:

1. Thirty Days: Collect the following daily: temperature, pH, turbidity, TSS, conductivity, humidity, air temperature, wind direction, wind velocity, barometric pressure, and rainfall.
Collect the following once per week: Dissolved oxygen, carbon dioxide, hydrogen sulfide, chlorides, phosphates, hardness and bacteria culture.
Soil tests needed to be collected only once.
2. Two Weeks: All tests to be conducted Monday, Wednesday, Friday with the following exceptions: weather data-daily; soil tests - once.

IV. VALUES CLARIFICATION STRATEGIES

A. Brainstorming:
Each person write down solutions and compare, or one person write suggestions on board (dredging, getting rid of ducks, stop fertilizing grass, vary fish species, introduce scavengers).

B. Get rid of lake


Bury it all Ben
Increase taxes as much as necessary to save the lake
Spendthrift Sally
2. Get rid of ducks
The more ducks the better
Randy "wringer neck"
"Lucy lov'a duck"

3. Taking a stand:

Drain the lake	Fry the fish
Leave it alone	Do away with ducks
Saturate the lake with herbicides	Down with ecology

C. Values Voting:

1. Would you be willing to spend one Saturday morning a month clearing out debris on Freedom Park Lake?
2. Would you like the lake to accommodate more water activities?

V. RESOURCES

Books:

Freshwater Ecology, W. A. Andrews, Prentice-Hall, 1972.
Environmental Pollution, W. A. Andrews, Prentice-Hall, 1972.
A Guide to the Study of Fresh-Water Biology, Needham and Needham, Holden-Day, Inc., 1962.
Experiments in Environmental Microbiology, Millipore Corp, 1969.
Water Pollution: A Scientist's Institute for Public Information Workshop, George G. Berg, pp. 17-20.

Filmstrips: (found at Charlotte Nature Museum)

The Pond: How living Things Change Their Environment, EVED, # 113.

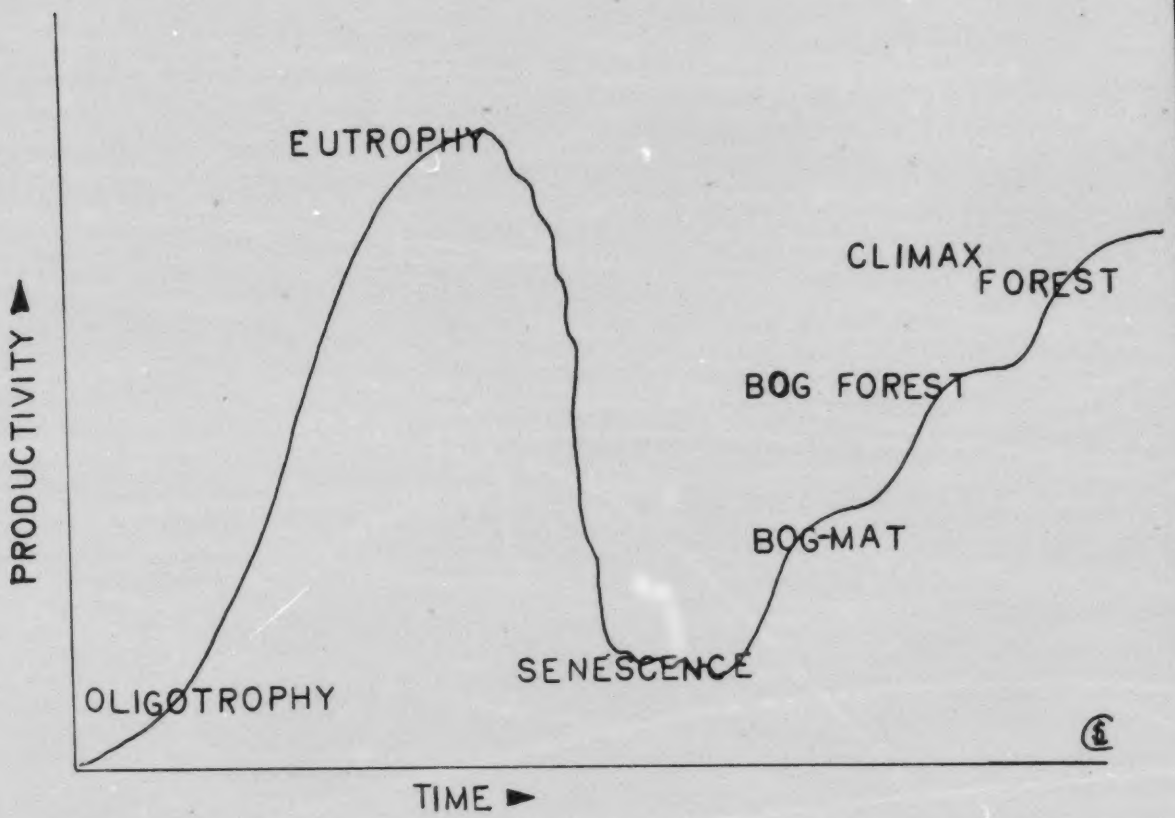
The Great Lakes
13, History and Ecology
14, Causes of Pollution
15, Results of Pollution

Films:
"Who Killed Lake Erie?" parts I and II, NBCTV, color, 52 min. (J-S).
"Deterioration of Water", Learning Corporation, color, 16 min. (J-S).
"Problems of Conservation - Water", EBEC, color, 16 min. (J-S).

Games:
Clean Water (2-4 players), Urban Systems.
Dirty Water, Urban Systems

Program Kits:
Can I Drink the Water? (Kit 6), Urban Systems.

Microscopic Slides:
"Algae and Environmental Problems," # 95, W 0229, Ward's Natural Science Establishment, set of 25 with excellent manual.



LAKE AGING AND PRODUCTIVITY

POPULATION:

People, People, and MORE People

I. INTRODUCTION

Our current population crisis is now costing us heavily in money, social problems, and lost liberty. This crisis is becoming more and more critical each day.

In 1900: United States produced 15% more raw materials that we used.

In 1950: United States was consuming 10% more raw materials than produced. Also 53 vital minerals were on a critical shortage list, according to a Presidential committee.

In 1970: United States was consuming 40% of world's goods and services and had only 6% of the world's population.

Foreign nations face the same shortages, because of their population gains.

World population has been slowly increasing for a long time. Assuming that you have a normal pulse beat, it will not quite keep up with the increase in world population. Every time your pulse throbs, the population of the world will have added one more human being.

In 20 years from now:

- Five people will be standing where 3 people stand now.
- 55% of all people alive will be less than 15 years old. Even today, China has more children under 10 than the total population of Russia.
- In the United States there will be 62 million families in place of the 48 million today.
- Almost 9% of those who are heads of households will be under 25 years old, almost double the number of young householders today.
- About 3/4 of all people will live in urban areas. Half of all Americans will live in 3 great metropolitan areas.

Given sufficient natural resources, a population will continue to increase in size unless some limiting factor is imposed. Such factors as space, available food and water supply, diseases, mutations, and the depletion of natural resources will have a significant effect on population growth.

Results of work done at the Albert Einstein Medical Center, Philadelphia, with mice, rabbits, and other mammals, indicates that endocrine feedback mechanisms exists in mammals. These internal mechanisms can regulate population's growth in response to increases in population:

1. Reproduction functions lessened in both sexes.
2. Sexual maturation was delayed or, in higher population desitities, totally inhibited.
3. Weights of accessory sex organs declined.
4. Death of fetuses in the uterus increased.
5. Inadequate milk secretion in mice.
6. The female egg cycle was extended.
7. Increased susceptibility to infections and parasitism.
8. Increased fighting and aggressiveness.

Human resources include the abilities and capabilities with which we are endowed -- our physical, mental, social and spiritual capabilities.

In early animal populations studied, numbers increase until the carrying capacity has been reached and the environment can sustain no higher population. At the point where population pressure equals the environmental resistance, the population levels off with varying degrees of fluctuation. Not withstanding man's ability to modify his environment, there is no reason to expect that these same biological principles will not apply to human population.

Man is developing the technical knowledge needed to control his population growth. As yet, this knowledge has not been applied to any considerable extent. Wide socio-cultural concern about the problems and acceptance of the means of control must prevail if population growth is to be curbed.

Without the imposition of checks on population growth, either by nature or by man himself, population will increase beyond the capabilities of man and natural resources to sustain a high level of living.

ENVIRONMENTAL ENCOUNTER

II. Behavioral Objectives:

At the conclusion of this encounter, the students should be able to:

1. Discuss four factors that determine population growth.
2. Discuss three problems present today that are threatening to make man an endangered species.
3. Demonstrate a clearer understanding of what has been done to meet the population growth problem by listing some specific things that must be done in the immediate future to alleviate the present situation.
4. Discuss man's responsibility to develop an appreciation of and respect for others rights for a clean natural environment.

III. Activities:

1. Have a student find out the population growth in Mecklenburg County for the past 20 years. Let the class make a graph to better show this. To carry this activity further, another student could find out the area size of Mecklenburg County, and from both activities, the class could determine the average amount of space at present available per person.
2. Speakers and pamphlets from the Carolina Environmental Study group, Environmental Protection Agency, U.S.Department of Labor -- Occupational Safety and Health, or the Metrolina Environmental Concern Association (see resources available).
3. Divide class into groups to research and report to the rest of the class on the factors that affect population growth.
4. Students bring in newspaper and magazine articles or TV ads relating to population control.
5. Debate: Resolved: Unless man can maintain some measure of individual freedom and dignity and avoid the frictions of crowding, he will destroy himself by shock or increasing strife resulting in nuclear oblivion or depletion of resources.
6. Group Project: 5-6 students
   Have students obtain permission from proper authorities to visit a cemetery for the purpose of gathering data as to average life spans today compared with 20 years ago; 50 years ago; 100 years ago. This could lead into a class activity to find out the reasons for increased life spans, and the problems it presents.
7. Read Brave New World (science fiction) by Aldous Huxley and compare the type of human life existing then and now.

IV. VALUES CLARIFICATION

A. Rank Order:

1. Students can take a field trip to a nearby area where new buildings have replaced natural fields, woods, etc. Ask them to compare the relative importance of construction to the maintenance of the natural environment.
   Rate in order of importance:
   Which is best --
   a. To provide for residents?
   b. To provide amusement for tourists?
   c. To maintain natural beauty for tourists, children, adults?

2. In which order should the following measures be undertaken to alleviate the population problem?
   - legalize abortion?
   - limit each family to 2 children and sterilize parents afterwards?
   - distribute birth control information everywhere?
   - trust people's common sense to limit family size?

B. Continuum:

(Sue believes everybody should be sterlized at birth to prevent fertilization)

(Larry believes that everyone should live forever and is working on devices to make sure 100 year olds can still have childrer

C. Role Playing:
You are a teenager in the year 2100, who wants to get married, but marriage is unacceptable because it encourages having children. How would the parents react? Friends? You?

D. Values Voting:
How many of you ---
- think people should limit the size of their families to two children?
- would favor a law to limit families to 2 children?
- have written a letter to your congressman expressing your concern for population control?
- would encourage legal abortion for an unwed daughter?
- think there is nothing morally wrong with using the Pill for birth control?
- think mercy killings should be legalized?

(Could also be used in rank order)

E. Fall-Out Shelter Problem:
Suddenly the Third World War breaks out and bombs begin dropping. Places all across the globe are being destroyed. In their fall-out shelter, there are 10 people but only enough space, air, food, and water available for 6 people for a period of 3 months -- which is how long they estimate they can safely stay down there. They realize that if they have to decide among themselves which 6 should go into the shelter, they are likely to become irrational and begin fighting. So they call your department, their superiors, and leave the decision to you. As a group, you have only 30 minutes at the most to eliminate 4 of these, realizing you must get to your own shelters. Two important considerations: 1) the 6 remaining may be the only 6 left to start the human race over again. Do not allow yourself to be swayed by pressure from anyone else. If you do NOT make a choice in a half hour, then you are actually choosing to let the 10 people fight with the possibility that more than 4 might perish. Here is all you know about the 10:

1. Bookkeeper, 31 years old.
2. His wife, 6 months pregnant
3. Black militant, 2nd year med. student
4. Famous historian, author: 42 years old
5. Hollywood starlet, single, dancer
6. Bio-chemist
7. Rabbi, 54 years old
8. Olympic athlete, all sports
9. College co-ed
10. Policeman with gun.

V. RESOURCES

Books:

People and Their Environment: Biology Teacher's Curriculum Guide to Conservation Education, Matthew J. Brennan, J. G. Ferguson Publishing Co., Chicago, Illinois.

Population, Evolution, Birth Control, Garrett Hardin, W. H. Freeman and Company, San Francisco, 1964.

Man -- An Endangered Species? U.S.Department of Interior Conservation Handbook, # 4.

Population, Resources, Environment, Paul and Anne Ehrlich, W. H. Freeman Company, 1970.

Environment and Man, Richard H. Wagner, W. W. Norton and Company, Inc., New York, 1971.

Modern Lesson Plans in Environmental Science, Kotsonis, Baker, Parker Publishing Company, Inc., West Nyack, New York 1974.

Environment and Man, Wagner, W. W. Norton and Company, New York, 1971.

The Population Challenge -- What it Means to America., U.S.Department of Interior Conservation Yearbook, # 2.

Games and Kits: (Available at Environmental Center)

Population: A Game of Man and Society.

Ecology -- The Game of Man and Nature.

Our Environment: Problem or Progress.

Smog.

Filmstrips: (Available at Environmental Center)

"America's Urban Crisis," (set of 6), SVE.

"Population Statistics" (The Ecological Crisis), SVE.

"Population Trends," SVE.

"Evolution and Extinction," SVE.

"Human Ecology," McGraw-Hill.

"Environment: Changing Man's Values," Guidance Associates.
Part I: The Enemy is Us.
Part II: Remaking the Patterns.

"Ecology: Understanding the Crisis," EBF.

Films: (A.V.Department, Charlotte-Mecklenburg)

"The Living City," EBF, 1953.

"Living in a Metropolis," DeRouchment Association, 1948.

"Man's Impact on the Environment," Modern Learning Aids, 1967.

" Multiply and Subdue the Earth," National Education Television, 1969.

"Nature's Half Acre," Disney, 1953.

"Population Ecology," EBF, 1964.

"Population Explosion," National Film Board of Canada, 1968.

"Boomsville," National Film Board of Canaca, 1969.

"India -- Urban Conditions," McGraw-Hill Films, 1968.

"A Nation of Spoilers," Higgins, 1964.

THROW-AWAYS:
WHAT CAN BE DONE?

I. INTRODUCTION

Americans seem to thrive on the philosophy of " buy, use, throw away and buy again." Since this is at the heart of the country's economic machinery and our industries thrive on it; our officials advocate it; our economy demands it; and our people love it, the consequences are becoming apparent. Leaders are beginning to realize that every man, woman, and child is literally a garbage factory. Solid waste has doubled since 1920 to 5.3 pounds of garbage per person per day. By 1980, it is estimated that it will be eight pounds per person per day.[1]

As we consider the problems posed by the increase in solid waste, it is evident that our present disposal methods are archaic and waste is polluting the land with litter and the air with smog and impurities. In view of the fact that litter and garbage are not only unpleasant and physically disturbing, but also affect human health by providing breeding places for flies or other vector organisms, and by polluting the air, water and land, all citizens must labor continously to understand our dilemma and do something to solve the problem.

There are several basic solutions to solid waste management that must be utilized so that solid waste pollution will not be converted into chocking air pollution or some other environmental quality hazards. Some of them are: better methods of disposing present waste, greater use of recycling to keep matter from becoming waste and a basic redirection of the " consume-discard" philosophy by educating the public on the feasibility of using recycled items. Citizens on the local, state, and national level can do much to reach these solutions.

Finally, as is true with other areas of pollution, solid waste problems in Charlotte, as well as the country as a whole, can be managed with a concentrated and consistent program of public concern, governmental support, industrial involvement, and more money. Without any of these, garbage will eventually become a problem of monumental proportions.

II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

At the completion of a successful encounter, the student should:

1. Comprehend the seriousness and urgency of the problems posed by the pollution of land and air.
2. Understand the problems caused by solid waste and the responsibility that all people have to solve them.
3. Realize that pollution recognizes no political boundaries and leads to chronic, long-range effects.
4. Understand that scientific disposal and utilization of wastes is necessary to the preservation of man and his environment.
5. Understand who pays the price for affluence in our progressive American Society.
6. Realize their role in changing our over-civilized, polluted, and denatured environment.
7. Understand how air pollution caused terrible episodes in London, New York, and other large cities.

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1 "Solid Waste: Running Out of Room at the Dump," Wachovia, Vol. LIX, August-October, 1972.

8. Understand the techniques used in observing, collecting and analyzing data, reporting, and other components of disciplined inquiry.
9. Know how to explore and use the legal structure as an instrument for change.
10. Understand the consequences of a variety of actions needed to involve people in decreasing pollution problems.
11. Appreciate the environment enough to preserve it's natural resources.
12. Understand the role that governmental agencies play in controlling air and land pollution.

B. Activities:

1. List the causes of air and land pollution.
2. Compare the causes of air and land pollution with the causes of water pollution.
3. Define and explain the major categories of air pollutants: surface friction, vaporization, and combustion.
4. Set up a litter court and try a "litterbug" carrying out the trial as a real court case.
5. Make a study of the garbage disposal system in Charlotte and write a research theme on the findings.
6. Evaluate Mecklenburg County as a potential site for photochemical smog formation by examining the following:
   Raw Materials
   Reaction Conditions
   Reaction Catalyst
7. Make a study of the relationship of solid waste disposal to the population explosion.
8. Do the following letter writing activities:
   a. Write letters to the sanitation department requesting information on our system for the disposal of solid waste.
   b. Write letters to obtain statistical data dealing with litter problems.
   c. Write letters to state legislators asking that legislation be enacted to curb pollution.
9. Write a poem describing a city filled with smog.
10. Write and present a skit on controlling litter disposal in order to stop pollution and contamination.
11. Use the steps of research in doing the following:
   a. Make a study of the effects of the Industrial Revolution on the environments of English and American cities.
   b. Do a research study of Charles Dickens' England in 1830, and compare it with America's city ghettos, crowded smoggy streets, and noisy highways.
   c. Locate, read, and discuss literary works dealing with environmental problems.
12. Follow the principles for writing good compositions in doing the writing assignments below:
   a. Write a composition on recycling the components of garbage and its feasibility.
   b. Write a comprehensive composition on the effects of solid waste on the environment.
   c. Write a composition answering the following question: "Can the hallowed concepts of democracy, freedom, or equality -- under law -- be operative in any meaningful way in our over-civilized, polluted, and denatured environment?"

III VALUES CLARIFICATION

A. RDA:

1. List items in Charlotte operated by fuel and label them as necessities or luxuries.
2. Using your list, indicate what the city officials may consider necessities and what they consider luxuries.

B. Role Playing:

With students posing as mayor, city council members, and interested citizens appear to request the council to take action on waste disposal problems.

C. Public Interview:

Plan and conduct a survey to determine the attitudes of classmates concerning air and land pollution.

D. Contrived Incident:

Let two speakers discuss opposing views on garbage disposal techniques. Following the speeches, permit the students to hold an open discussion giving their thoughts and feelings on the effectiveness of the techniques discussed by the speakers.

E. Autobiographical Questionnaire:

Ask questions which will examine the students' behavior in regard to pollution.

Have you ever:

- picked up litter from your street?
- burned trash outside?
- written a letter to the editor protesting a misuse of the environment?
- written a letter to a government official expressing your position on an environmental issue?
- attempted to investigate the disposal of wastes in Charlotte?

IV. RESOURCES

Books:

Andrews, William A., Environmental Pollution, Prentice-Hall, 1972.

Daiches, David and Others, English Literature, New York, Houghton Mifflin Company, 1968.

Daigon, Arthur, Write On! Issue-Centered Writing.

Elliott, Sarah ., Our Dirty Air. Messmer, 1971.

Leavitt, Hart Day, Stop, Look and Write. New York: Bantham Pathfinders Editions, 1968.

_____. The Writer's Eye. New York: Bantham Pathfinders Editions, 1968.

Miller, Perry and Others, Major Writers of America, Volumes I and II. New York; Harcourt, Brace and World, Inc., 1962.

O'Dea and Scott, Solving Writing Problems.

Schorer and Others, American Literature. New York: Houghton Mifflin Co. 1968.

Wagner, Richard, Environment and Man, W. W. Norton and Company, 1971

Wentworth and Others, Pollution. Mine Publications, Inc.,1971.

Films:

Activated Sludge Plant with Vacuum Filtration and Incineration, PHS.

Municipal Sewage Treatment Process. PHS

The Stuff We Throw Away, Stuart Finley, Inc. Falls Church, Virginia.

The Third Pollution, Stuart Finley, Inc., Falls Church, Virginia.

WATER POLLUTION:

"...nor any drop to drink."

I. INTRODUCTION

Since pollution is not a problem for scientists only, it is urgent that men take action that will halt and reverse the current trend of rewarding the man who finds new ways to exploit nature. Although unrestricted economic growth has become of foremost importance to our society, all of us need to understand the interrelationships that exist between man and the rest of nature. At the same time, man needs to become aware that the survival of the human species depends on whether or not every citizen makes an effort to stop what may eventually become an "eco-catastrophe."

Environmental pollution, which may be defined as the unfavorable changing of our surroundings largely by man's actions through direct or indirect effects of changes in energy patterns, radiation levels, chemical and physical constitution, and abundance of organisms, presents a crisis that cannot be met until every individual becomes concerned about and demonstrates through his actions as a member of society, that pollution is a health problem, an economic problem, an aesthetic problem, and a problem in conservation of natural resources.

Looking at environmental problems, citizens readily see that there are varied types of pollution that must be explored and understood if living conditions are to be improved. Although all contamination must be considered, it is urgent that men develop the technical and sociological knowledge needed to provide clean water for all people. This may be done by finding procedures for processing contaminated water, such as filtration and chlorination, regulating soil erosion, the dumping of wastes into water, and regulating the use of phosphates, pesticides, and other chemicals.

Although the amount of water on earth seems to have remained constant for millions of years and is continously recycled, man is causing so much of it to become polluted that the supply available for human use is dwindling. According to the 1971 EQ Index, "North Americans are removing fresh water from underground sources twice as fast as the hydrological cycle can replace it. Europeans three times as fast. At present rate, Americans will need 700 billion gallons of underground water per year in 1980; and only 650 billion will be available."

Since many industries and businesses contribute to the pollution of water, the entire citizenry must become educated to the extent that steps will be taken to decrease the number of water contaminants that are increasing daily. This can be done through the efforts of informed and interested citizens to dramatize the origins, nature and disastrous consequences of water pollution and point out that man cannot escape the consequences caused by dumping large amounts of waste into his environment.

As modern Americans face the problems posed by water pollution and try to solve them, they must note that water does not respect political boundaries; therefore, water pollution and water uses must be controlled on the local, state, and national and international levels.

II. BEHAVIORAL OBJECTIVES

At the completion of a successful encounter, students should:

1. Demonstrate through oral and written activities an increased awareness of environmental problems gained through student involvement in ways of understanding the problems and means of solving them.

2. Demonstrate through written activities an understanding of effects of water pollution on man and his environment.
3. Demonstrate knowledge of research skills in resource information by discovering and using resource information to solve the water pollution problem.
4. Demonstrate through oral and written activities an understanding of the relationship between an increased population and the quality and quantity of water a community has.
5. Demonstrate through oral and written activities a meaningful awareness of the need for water conservation.
6. Demonstrate through oral and written activities an understanding of the reduction in exposure to the pollutants in water will improve the community's health and welfare.
7. Communicate with the government by writing of his concerns to those agencies responsible for protecting the citizen's health and safety.

III. ACTIVITIES

1. List vocabulary words related to environmental problems giving dictionary and working definitions for each word listed.
2. List several types of water pollutants.
3. Use as many adjectives as possible to describe water.
4. Use water samples to locate pollutants in water, and discuss your findings in a good composition.
5. Write letters asking city, county, and state politicians to enact legislation to curb water pollution.
6. Hold a "mock" (City Council) meeting to discuss legislation on environmental problems with emphasis on "clean water" and an ample supply of it.
7. Prepare a list of suggestions for a safe waste disposal system using complete sentences.
8. Prepare a scenario of the future concerning the pollution problem -- one if we control it -- one if we don't.
9. Write a composition of argument stating that man cannot hope for a future with more than mere survival until our environment is unpolluted and in harmony with human adaptations.
10. Study the effects of sewage, detergents, and other chemical residues on clear blue lakes and sparkling rivers.
11. Consult the health department for information regarding acceptable standards of quality for drinking water and for water used for swimming.
12. Locate, read, and discuss poems, essays, and short stories dealing with water and other natural resources.

IV. VALUES CLARIFICATION

A. Rank Order:

1. List industries that cause water pollution.
2. Using the list, indicate the importance of the industries by numbering them according to their value to you.
3. Decide which ones you could most easily live without.

B. Role Playing:

1. Pose as William Wordsworth and deliver a brief message on the effects of the Industrial Revolution in England.
2. Let two students pose as Coleridge and Southey answer questions on the Lake District in England with the interrogator allowing them to quiz him on problems caused by pollution in our society and what has happened to many of our rural areas. (Other writers who lived close to nature may be used.)

C. Pictures Without Captions:
Using several pictures depicting environmental problems, write captions for them and discuss the captions in small groups.

D. Contrived Incident:
Invite a guest speaker to the class and let the speaker and the teacher make speeches giving opposing views on controlling water pollution. After the discussion, permit the students to discuss their thoughts and feelings on the problem.

V. RESOURCES

Books:

Andrews, William, Environmental Pollution, Englewood Cliffe: Prentice-Hall, 1972.

Barnhart, Clarence, The New Century Handbook of English Literature. New York: Appleton-Century-Crofts, Inc., 1956.

Chart, D.A., Pollution Probe. Chicago: New Press, 1970.

Cleaning Our Environment: The Chemical Basis for Action. Washington, D.C.: American Chemical Society, 1969.

Daiches, David and Others, English Literature. New York: Houghton Mifflin Company, 1968.

Hutchinson, G. Evelyn, Treatise on Limnology. New York: Academic Press, 1957 and 1967.

Leavitt, Hart Day, Stop, Look, and Write, New York: Bantam Pathfinders Editions, 1968.

Leinward, Gerald, Air and Water Pollution. Buffalo: Washington Square Press, 1969.

Miller, Perry and Others, Major Writers of America, Volumes I and II, New York: Harcourt, Brace and World, Inc., 1962.

Wilber, C. G., The Biological Aspects of Water Pollution, Springfield, Ill.: C.C.Thomas

Films and Filmstrips: (Available from Environmental Center - Nature Museum)

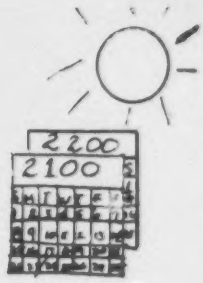
Environmental Pollution - Our World in Crisis. Ward's Scientific.
Heritage of Splendor, Alfred Higgins Production.
A Matter of Time, Conservation Foundation.

Games:

Clean Water, Urban Systems.
Dirty Water, Urban Systems.

ENERGY:

PROSPECTS FOR THE FUTURE



I. INTRODUCTION

Energy--Our concept of it before 1970 was the power that comes from burning coal or oil or natural gas; in other words, power from fossil fuels. In the '70's, our concept has changed slightly with the realization that the fossil fuel supply is dwindling and a serious shortage is evident and growing. With the 1970's comes the advent of the atom to produce a great amount of energy, and nuclear power is developing as a major source of energy in many areas.

There is no doubt that something must come to supplement the fossil fuels as the major power sources. Our future looks dim if we ignore the fact that the resources are exhaustible, but the fact has not been ignored. Scientists have long been probing the earth for additional power sources which one day must take over the role of the fossil fuels. They have come up with various ideas of deriving usable energy from the sun, the earth's internal heat and steam, the wind, some biological wastes, etc., a vast and imaginative variety of possible sources but at the present, nuclearfission has presented itself through much research to be the closest answer to the question of new power resources. By 1980, it will account for approximately 20% of the United States' generating capacity. The age of nuclear power is ever more evident with its potentials and its problems, and it is important that Americans understand them both and draw their own conclusions about atomic energy.

II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

At the end of the encounter, the students should be able to:

1. List and explain the various sources of nuclear energy.
2. Know local nuclear plants and plans of future ones.
3. Demonstrate the efficiency or inefficiency of the plants.
4. List and compare the advantages and disadvantages of nuclear power (at least 5 for each).
5. Think of 2 new ways to prevent radioactive pollutants from escaping the nuclear plants.

B. Activities:

1. Find out what nuclear power plants are located in your area.
2. Take a tour of one.
3. Do a report on what you see there.
4. Play the Energy Environment Game.
5. Have speakers from N.P.P. (public relations).
6. Do research (or discuss) on relations between present N.P.P. and thermal pollution.
7. The Thermal Pollution Game, Houghton Mifflin Company.
8. Discuss alternatives to thermal pollution.
9. Slide Script: "Thermal Pollution", Environmental Education Center, 13 Veterans Drive, Oteen, N.C. 28805.
10. Film, "Energy to Power," 4160 EBF 30, Encyclopedia Britannica Films, 1957, Audiovisual Media Center, 1601A Park Drive.
11. Film, "Nuclear Energy", 30 min., Encyclopedia Britannica, 1957, Audiovisual Media Center, 1601A Park Drive.
12. Read and Discuss, "Energy", (Our aligator River Story, strategy).

III. VALUES CLARIFICATION

A. Energy Exploitation:

1. Alligator River story --

Once upon a time . . . there was a housewife named Mrs. Moore who lived in a push-button convenience house with all the essentials for an easy life of housework. Her day would consist of vacuuming with the air conditioner running full blast while the TV blurted out a nonsense of running soap operas, leaving lights on everywhere, at any time, (even on sunny days), letting the radio entertain her in the kitchen where the washer was screaming, the dryer was heating up the room, the can opener hummed, the refrigerator door stood open, the stove and oven heated the noon-day meal, and the plate warmer toasted the cold china.

Recently Mrs. Moore joined an ecology group at the community center and she is always the first to tell a store that its air conditioning is unnecessarily cold.

Her teenage son, Waldo, arrives home from school at 2:30. For a while he tinkers with his '61 Buick which eats gas like a hog and sends out a camouflaging smoke screen from the rear. Since he has a part-time job at a filling station, he always has money to fill up the tank and to cruise the gauge to "empty" in one evening. The old car is also an oil gobbler and requires about 2 gallons a week. He claims he needs the car to go to school since he leaves early, but actually it is for the morning drag race to school with his buddies, each of whom drives a gas-guzzler. At school he takes Environmental Studies and is an active participant in all clean-up activities to local dumps and lakes.

Mr. Moore is in charge of managing the King Power Company. Recently he has been feeling pressure from local environmental concern groups to stress energy conservation. He has set up a program to advertise a "Conserve the Energy" idea in this community and has helped the cause by suggesting a price increase. He claims there is a shortage of supply but due to equal demand the cost goes up. In another community still using King Power, he is stressing more use and claims that there are amply energy resources. Both ways King Power wins out.

Down the street from King Power is Gus the Gas Guzzler's gas station, Gus's Gas Pump. Gus is greedy so he raised his price to 72.9, knowing that his gas station was the only convenient one and he held a monopoly on this community's gas needs. In order to legally carry out the price increase, Gus gives free gas to all local government officials, including Mr. Moore, a councilman, who eagerly accepts the free gas for his thirsty Electra 240, although he drives it very conservatively. Gus tells the public that supply is running low and upper officials are cutting his supplies even further. There's always an apology on lips of that greedy smile.

B. Baker's Dozen:

Purpose: A theme which runs all through these strategies is that in order to make some sense out of the bewildering array of alternatives in our life, we have to set some priorities. This shortage gets at the issue in a fresh way.

Procedure: The teacher says, "Make a list of 13 things (a baker's dozen), that you personally use around your house which make use of

electricity. This includes anything at all with plugs which you use fairly frequently.
"Now draw a line through the 3 things you could live without the easiest. If, for example, there was an acute power shortage, and every house was asked to cut down on its use of electricity, which 3 could you give up most easily? These are the 3 you'd cross out. "On the other hand", which 3 do you find very precious? Draw circles around these 3. These would be the last ones you would want to give up."
The teacher asks for volunteers to read their circled and crossed out items.

C. What We Know and What We Want to Know:
Purpose: This strategy helps show the relationship between the standard subject matter of the school curriculum and the values level of the subject matter as discussed in Chapter One. It argues that what would be most helpful to students about any topic they study in school is how that topic can illuminate their own search for values. This strategy is also a good way to generate student interest in a particular topic.
The activity teaches a pattern of learning that can be useful throughout life, when students are trying to find answers to their real questions -- their values questions.
Procedure: At the beginning of a unit of study, the teacher says, "there are many things you probably already know about this topic (on nuclear power), even though we may not have studied it formally in school. Let's see what you do know about nuclear energy. Two students are secretaries and record the items on the board under two headings: What you do know and what you would like to know. The questions under "What you'd like to know" become the basis for group reports or for individual research.
The students may come up with important personal values like "would I feel safe working in one?" "What other methods of energy production can I think of if I oppose nuclear generation?"

D. Reaction Statements:
Purpose: This strategy causes students to thoughtfully consider a variety of values issues and to publicly affirm their reactions to these issues. (Read the procedure pg. 385.)
Statement: Scientists researching nuclear energy had been cut off from funds. They plan to continue use of nuclear generation on their own decision even though a secure measure of disposing of nuclear wastes has not been found.

IV. RESOURCES

People:
Public Relations man from Duke Power.
The man who spoke to chemistry classes on Nuclear Power.
A person from Exxon to tell about Exxon Nuclear developments.
Someone from EPA to explain the dangers of nuclear generation.
(possible debate between Duke Power Man and EPA).

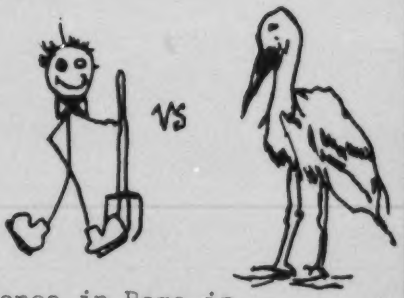
Articles:
Nuclear Power Safety, Gray, Jerry, Atomic Industrial Form, Inc., 1974.
Nuclear Power and the Environment, American Nuclear Power Society, 1974.
Low-Level Radiation, Atomic Industrial Forum, Inc., 1974.
Thermal Pollution, Lenk, Alan (c.O.), Env. Ed. Center.

Films and Slides:
"Energy and Power," EBF, 4160.
"Nuclear Energy", EBF.
"Thermal Pollution", slide script, 1957.

Extra:
Cains, John, The Energy Ecology Confrontation Thermal Discharges from Steam-Electric, from Pollution by N.A. of Biological Teachers, 1973.
Environmental Quality, Atomic Energy, Consumers Power Company, 1971.

FAMINE:

STORK vs FARMER



I. INTRODUCTION

The fanfare that ballyhooed the World Food Conference in Rome in November, 1974 had not died out before the delegates began an arduous task of mapping policy. The task was far from easy. No one could come up with proposals which would allow the poor nations to be fed without costing the richer nations more than they could afford to give. This dilemma is to be the topic of this encounter.

With nearly one half-billion persons suffering from some form of hunger and with 10,000 dying each week obviously the time for action has been reached. Many factors have contributed to the present crisis - overpopulations, bad weather, insects, war - none can be solely blamed, but all contribute to a supply problem and as supply goes down price goes up. The old law of supply and demand is at work.

World food reserves are down to a record low of 26 days (95 days in 1961.) Short harvests and high prices have forced the food rich countries to attempt to hold their crops for fear that worse conditions are near.

Neomalthusians would dance gleefully to see that their predictions of starvation are true; even though they would react in sorrow to the misery. Parson Malthus predicted this over two centuries ago. Why did no one listen? Even more recently the Paddocks in their book FAMINE 1975 forsaw this problem. No one listens, no one acts . . .

Norman Borlaug won the Nobel Peace Prize for his efforts to do "something." He is the father of the much heralded Green Revolution, designed to produce miracle grains giving bumper harvests. Unfortunately the high costs of energy, a necessity for the revolutions success, have prevented the U.D.C.'s (under developed countries) from making full use of these genetic miracles.

Without population control Borlaug concedes that his discoveries may have been more harmful than helpful. Today the world grows at a rate of 200,000 per day . . . 75 million per year. Borlaug said recently, "our efforts to buy time have been frittered away because political leaders in developing nations have refused to come to grips with the population monster."

At the World Population Conference held in Bucharest late last summer ridicule was heaped upon the D. C.'s (developed countries) by delegates from the U.D.C.'s who complained that overpopulation was a myth invented by the rich to exploit the poor.

It must seem exploitation when Americans are eating food among 210 million that if shipped to China and fed to the average Chinese it would feed 1.5 billion. Do the Americans want to change their meat-eating habits for a more vegetarian (less consumptive) one?

Another alternative to change of habits would be to grow more food. This was the thrust of Borlaug's discovery but his improved varieties are more vulnerable to lack of water and fertilizer. Both of these materials tend to be in short supply in the U.D.C.'s. In the United States there are about 400 million acres that could be farmed that are not presently being used. Most of this acreage is in pasture, forest, etc. To start farming this unused land would cost in the neighborhood of $400 billion. To put this in perspective our GNP for 1973 was only $1.1 trillion. This means just to start farming we would have to raise

prices on all items 33% or to cut our consumption by 1/3 without any price decrease. This amount of money is just to START the farming. These lands would be marginal at best and would require large amounts of water, fertilizers and pesticides.

The same limitations hold true for the rest of the world. There are 7.8 billion acres of arable (farmable) land and only 50% is in use. The problem lies in the fact that to add additional land to the world's farms would be as expensive if not more so than in the U.S. We could increase the yields per acre in the poorer countries but only through increased irrigation and fertilization and pest control all meaning $$.

Farm the limitless oceans... David Wallace of the N.O.A.A. points out the fallacies of sea farming through the studies recently completed showing that the sea is a very delicately balanced ecosystem that can be easily upset through manipulations than attempt to increase yields. Only the top 15 meters or so are productive anyway and this amount of water is not enough to really "feed the world" as was once thought.

Help...the cost of such help is staggering as can be seen in the following analysis:

-to add 25% to the irrigated lands of the world $ 3.5 billion/yr for 11 years.

-to expand fertilizer production to meet demand-$8 billion/yr until 1980 then $12 billion/yr.

-to add 10% to the arable land cost is $400 billion -$1 trillion!!

The wealthy countries could help - - the U.S. could cut out the 1.3 million tons of fertilizer that it dumps on lawns, golf courses, etc. and transport this amount to the U.D.C.'s where it would cause 65 million to be fed; we could stop feeding our pets and save other millions of tons to give to the poor; we could stop eating beef, pork, and other meats th allowing a more effiecien usage of the grain. (see figure 3). Are Americans callous?

Many experts have suggested that we try the theory of <u>triage</u>. This method is a cold, calculating way of dividing countries into three groups.

-one group is hopeless; waste no effort on them.

-one group is going to have to really work, but it can save itself; give this group nothing but encouragement (verbally)

-the third group can be saved but only with massive and immediate aid; we give them both.

With the limited resources that we have available there is no need not to accept the triage theory as the logical alternative ... so runs the argument of the proponents.

What has forced us to the choices mentioned above? A famine the likes of which are not yet known.

II. BEHAVIORAL OBJECTIVES:

Upon successful completion of this encounter the student will:

1. Have developed an understanding of poverty level living conditions in other countries by living on the U.S. poverty diet for 3 days.
2. Be able to list and describe three causes for world famine.
3. Describe the Malthusian Theory either verbally or written.
4. Be able to write an essay on Borlaug and the "Green Revolution."
5. Write a supportive essay on <u>triage</u>.
6. Be able to add the costs of the various types of aid to the U.D.C.'s and to critically analyse in writing these methods.

III. ACTIVITIES:

1. Research the level of living that a U.S. poverty family must have. Develop a diet around the monetary conditions and live on this diet for a three day period.
2. Read any one of the resources listed in the references and discover the causes for world famine.
3. Find out through research who Thomas Malthus was; also who are the Neomalthusians. What are the ideas represented by by these groups?
4. Read the article "The Green Revolution" by Maddox and critique it.
5. Find the Book the POPULATION BOMB and read the section on triage- outline this section.
6. Write a short paragraph on food and population policy in the following: India, USSR, USA, Bangladesh, Ethopia.

IV. VALUES CLARIFICATION STRATEGIES:

1. Role play - - World Food Conference representatives from India, USA, USSR, France, Bangladesh, and Ethopia meet over a coffee break and begin to discuss how much the D.C.'s should give to the U.D.C.'s
2. Alternatives search

Alternative	agree	uncertain	disagree
a. do away with pets			
b. live with meat once/week			
c. tax increases for foreign aid			
d. increase subsidesy to farmers			
e. limit Americans to 1 child			

3. Who's To Blame

The scene shifts to the country of Bangladesh where there is a hovel and inside a family of 18 children and the mother. The father of these 18 is out in the field plowing with his new ox. His family is living at starvation level, now that the World Fertilizer agent has restricted his export of fertilizer to Bangladesh. The agent was forced to do this because the U.S. farmers were willing to pay four times what the farmer in Bangladesh could afford. The American farmer was willing to pay this much because his profits had recently skyrocketed through grain deals with the Petroleum Exporting Countries who now had the money to pay for the food with their high prices on the oil sales. The P.E.C. thought the high price of oil was only fair since they had been cheated for over 50 years.

Rank order these people as to who is worst and who is best. List the reasons why you chose the way that you did.

V. RESOURCES:

Population Bomb, Paul Ehlirch, Ballentine Books, 1968.
Population, Resources and Environment, Paul and Ann Ehrlich, W. H. Freeman, 1970
"Food and Population," Scientific American, Sept. 1974, pp160+.

"World Food Situation," Science, vol. 181, 17 Aug. 1973, pp.634+.
"World Food Crisis," Time, 11 Nov. 1974, pp.66+.
Hunger, Margaret Mead, Scientists Institute for Information, 1970.
"The Militant Malthusians," Saturday Review, 11 Mar.1972, pp. 40+.
The Hungry Planet, George Borgstrow, Wiley and Sons, 1970.
Famine - 1975, William and Paul Paddock, Little, 1968.
"The Green Revolution, " Saturday Review, 1972 ...
Limits to Growth, Donella Meadows, Signet, 1972.

INSECTIVOROUS PLANTS
AN ENVIRONMENTAL ODDITY

I. INTRODUCTION

Insectivorous or carnivorous plants are among the most interesting and unique plants in the world. These are the famous man-eating plants of science fiction fame. In actuality, there are no known carnivorous plants sufficiently large to consume a human. The group of insectivorous plants fall into 6 unrelated families and comprise nearly 500 species. Most, if not all, of these plants are adapted for survival without capturing prey. The prey seems to act as a diet supplement; some research has shown that survival for 15 years is possible without any meat in their diet for several of the plants. Most of these plants inhabit soil that is poor in nitrogen - peat bogs and heavy volcanic clays. The groups all have the ability to digest extracellularly - an oddity in the plant world; this digestion process takes different forms in the different families. In some families digestion seems to be accomplished by proteolytic enzymes; in others there seem to be considerable bacterial action; and in still others there is a combination of the two. The most important nutrients obtained from the animal bodies seem to be the nitrogeneous compounds. Several theories attempt to explain the evolution of the plants but none totally suffices. The evolutionary pattern is obviously parallel - none have extensive root systems, but all inhabit the same type areas, and all have highly modified leaves. In this encounter only four species will be considered. They are SARRACENIA (pitcher plants), DROSERA (sundew), DIONEAE (Venus'-flytrap), and UTRICULARIA (Bladderworts).

Sarracenia or pitcher plant has a leaf modification with the leaf rolled into a tube or a sac. The upper part of the leaf is usually modified into a highly colored lip or hood. This lip partly covers the opening into the tube. On the neck of the hood there are nectar glands whose function is to attract insects to the area. Once the insects get to the top they slip down the tube - upward mobility is limited by a series of downward pointing spines. The hapless insect ends up at the bottom of the sac where there is a pool of water, generally left from a rain, but sometimes a secretion of the plant itself. Various proteases then begin to act upon the insect. They are secreted into the water. The semi-digested proteins in the form of amino acids are absorbed by glands that line the base of the leaf. Leaves are generally clustered in a rosette from which arises a flowerstalk up to a meter high. The bisexual flower is a solitary bloom with a pentamerous arrangement of parts. One interesting modification of the bloom is its umbrella-shaped style which overlays the stamens. The style has five small stigma below the apices. Study of the drawing can help in the recognition of the plant. Further pictures are to be found in the filmstrip and in the slides.

Drosera or sundew is, generally, a much smaller plant than the pitcher plants, but it does not lack for highly specialized leaves. Depending upon the species, the leaves vary from narrow and thread-like to almost circular. All leaves bear numerous hair-like tenacles; each having a secretory gland at its base. The secretions are sticky in nature and evidence suggests direct tracheid connection giving rise to a sugary solution. These viscous drops glisten in the sun which is the reason for the plants common name. Once the insect has become stuck and struggles near-by tenacles close over the prey by bending slowly.

Several hours may be necessary before the insect is completely surrounded. The movements may be either chemonastic or thigmonastic or partly tropic or some combination. Whatever the reason the movement is accomplished through differential growth. Digestion occurs via enzymatic action. The enzymes are found in the secretions of the tenacles. Absorption of the digestion products is accomplished by specialized cells on the leaf's surface. Regular, bisexual, and generally pentamerous flowers arise on a long stalk from a basal rosette of leaves. See the drawings, filmstrip, and slides for illustrations.

Unique to the Carolinas' coast is Dioneae (Venus' -flytrap). All the other insectivorous plants have wide distributions but Dioneae is restricted to a very small area (see map). Like the two plants previously discussed, Venus'-flytrap has leaf modifications to capture and digest insects. The flytrap has an expanded blade with a hinge down the middle. The expanded part is further modified by stiff teeth which line the margins of each half. Inside each expanded half there are three trigger hairs. Cells of the leaf contain a red pigment, probably to attract insects. Some cells secrete a digestive fluid. When an insect triggers the leaf the halves snap closed interlocking the stiff marginal hairs to prevent escape. Preliminary closing takes only a second but complete closing may take several hours. The rapid movement of the leaf is not understood. Turgor pressure changes in the hinge area has been advanced as a possible explanation. Growth results in the complete closing of the leaf. After a few days the leaf again opens and awaits another victim. Opening of the leaf is probably epinastic. Digestive fluids are secreted after the leaf is closed and the amino acids are absorbed by surface glands. The leaves are arranged in a rosette varying in height from 5cm to 15 cm. The flower stalk bearing an umbel-like cyme arise from the rosette. This plant is so unique and rare that a prohibition against collecting is necessary. It can be obtained from many commercial sources. See the illustrations.

Last of the plants to be discussed is Utricularia or bladderwort. This differs from all the others in that it is a totally submerged, rootless plant. The bladders from which the plant gets its name are borne on finely divided leaves. There may be hundreds or even thousands on a plant depending on the health of the plant. The bladder is a marvel of construction - it sets its traps by expelling most of the water inside. When an organism touches one of the four sensitive hairs the valve opens and the inrush of water pulls the unsuspecting prey inside. The valve then snaps closed immediately trapping the prey. Digestion seems to be by proteolytic exzymes and some bacterial action. Each of the bladders is 0.8 mm by 0.6 mm (average) so the prey is generally small. The flower of the bladderwort is aerial and generally supported by floating leaves. The flower is bisexual, sometimes solitary, but generally in a raceme or spike. Many of the specialized features discussed can be seen in the illustrations.

Many insectivorous plants fall prey to collectors who have no regard for an undisturbed ecosystem; others fall prey to swamp or bog drainage; some are killed by trampling by the so-called "back-to-nature" people who don't know what they are doing when they hike about. Admittedly there is no great economic value in any of these plants - the leaves of Drosera were once used to make a purple dye, Dioneae are sold to terrarium enthusiasts but one would be hard put to explain the rise of the American economy in terms of the preservation of any of

these insectivorous plants. The question of this encounter is whether we need concern ourselves over something of so little importance economically. Does a callous act toward this group of plants indicate a general disregard for natural conditions? A right or wrong answer to this does not exist; it all depends on one's values.

II. BEHAVIORAL OBJECTIVES

At the end of a successful encounter the student should be able to:

1. Identify by sight the four plant types discussed in the encounter.
2. Describe the leaf modifications of each of the four types.
3. Describe the function of each leaf modification.
4. Compare and contrast the various habitats of the four plants discussed.
5. Postulate reasons for the geographical distribution of the various insectivorous plants.
6. Postulate various evolution senarios to describe the plants today.

III. ACTIVITIES

1. Observe preserved specimens, 2 x 2 slides, filmstrip, and diagrams of the plants. Note particularlly the habitats of the plants for similarities.
2. Using some good general reference book (q.v. Encyclopedia Britannica or a general botany book) look up each of the four plants discussed in the introduction. Try to find information not included in the introduction.
3. Using the bulletin board illustrate the leaf modifications described in the introduction or found through research (#2).
4. Carry activity # 3 a step further and illustrate the functional aspect of each modification.(NOTE: this requires thinking!)
5. Research the habitats of the four plants discussed and prepare a table showing similarities and differences. If possible visit areas to see the plants in their natural conditions. View the slides and filmstrip again for visual information.
6. With a blank world map and a table of the 16 major species (table in Handbook of Biological Data p.330) place on the map the distribution of these plants. Prepare a classroom map.
7. Research evolution and with what you learn write an essay explaining the possible evolution of these groups of plants. Read your essay to the class and get their criticism.

IV. VALUES CLARIFICATION ACTIVITIES

1. Role Playing - Situation: a lumber company has plans to come in to the coastal region of N.C. where there is a very high rate of unemployment. The company has plans for a reforestation program and a resort hotel. Many people will be employed by this endeavor. Act out the following roles:
   a. conservationist
   b. lumber interest
   c. garden club member
   d. biologist
   e. inhabitant of the area
   f. unemployed worker

   These persons have met at a hearing on the request to proceed with the project. They are standing around the coffee pot.
2. Alternatives Search - the lumber company in # 1 above has

received permission to proceed with its plans. Your problem is to come up with various contigency plans. In other words what you would do if no court order can be gotten ... shoot the lumbermen, pull up the flytraps, burn the area, what? After listing your plans share them with another group of students . . criticize.

3. Rank Order - In the following sets there are three choices rank them in the order that means the most for you.

_____undisturbed habitat for Venus'-flytrap
_____spraying for mosquitos
_____clearing the land for lumbering.

_____motor-boating
_____bladderworts flowering
_____undisturbed swimming

_____herbarium collector collecting
_____undisturbed Venus'-flytrap plants
_____terrarium builder collecting plants (commercial scale)

V. RESOURCES

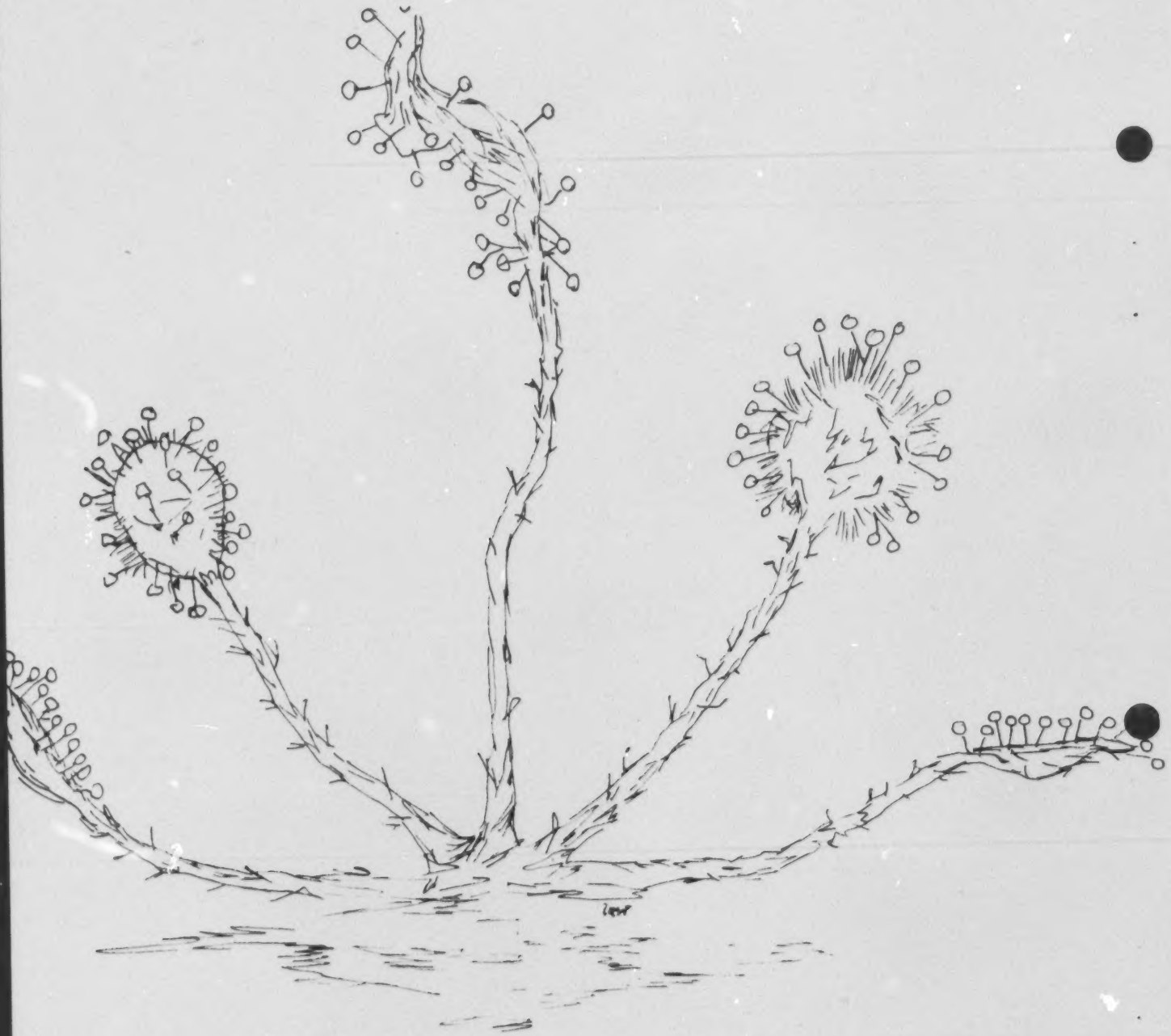
Taxonomy of Vascular Plants, George Lawrence, Macmillan, 1970.
Manual of Vascular Plants, Henry Gleason, Van Nostrand, 1963.
Botany, Carl L. Wilson, Dryden Press, 1957.
Biological Science, William Keeton, W. W. Norton, 1967.
Handbook of Biological Data,
Carolina Tips, Jon Hooft, Dec.1,1974, vol. XXXVII, no. 15.

SUPPLIES NEEDED:
Numbers given are for materials from Carolina Biological Supply, Burlington, N.C. 27215. (Other suppliers have these materials.)
PB 633. Insectivorous Plants Set $ 4.50
52-8710 Carnivorous Plants Filmstrip - $ 6.00
Many other items useful in this encounter are available see their catalogue.

FLYTRAP DISTRIBUTION

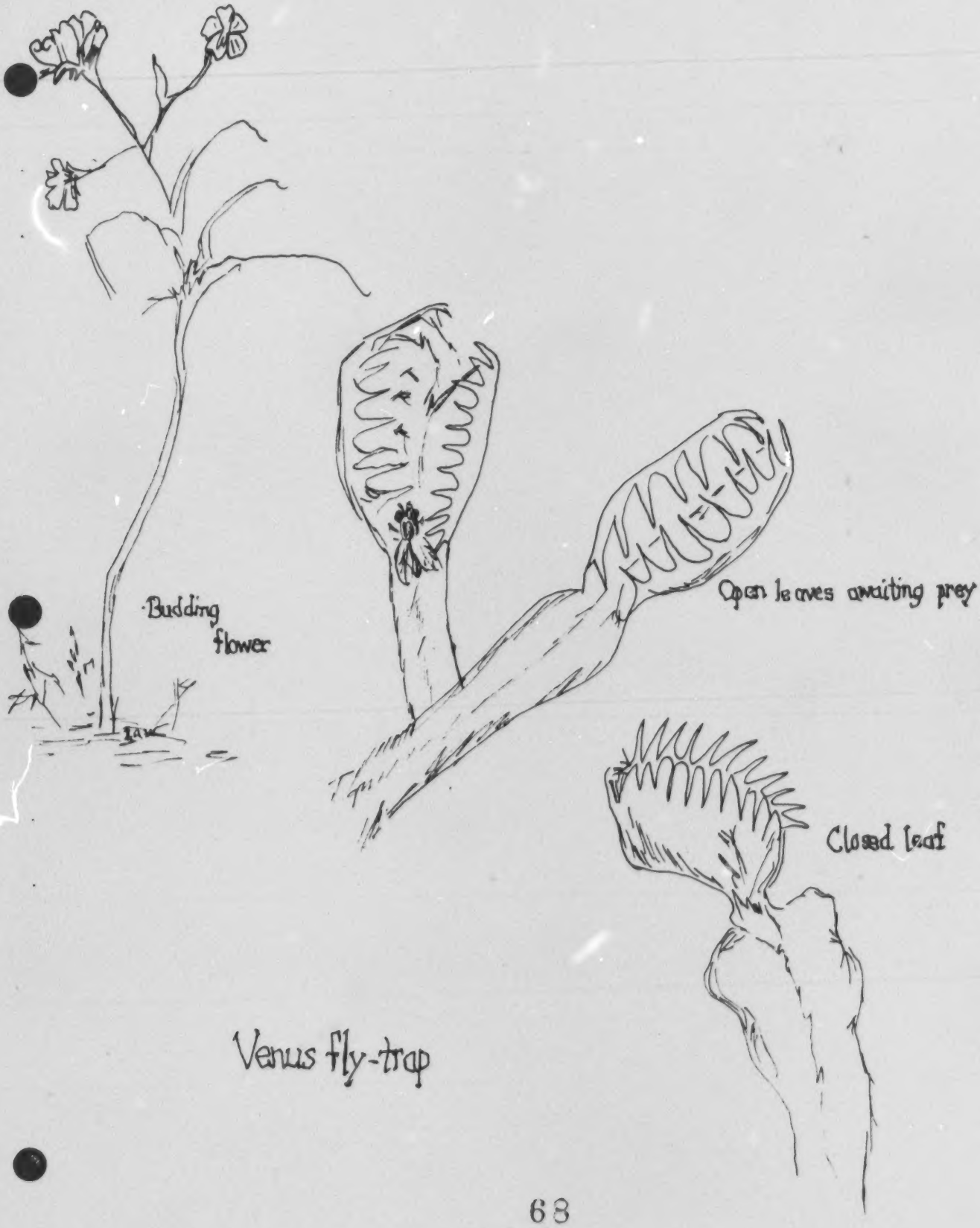
Pitcher Plant.

66



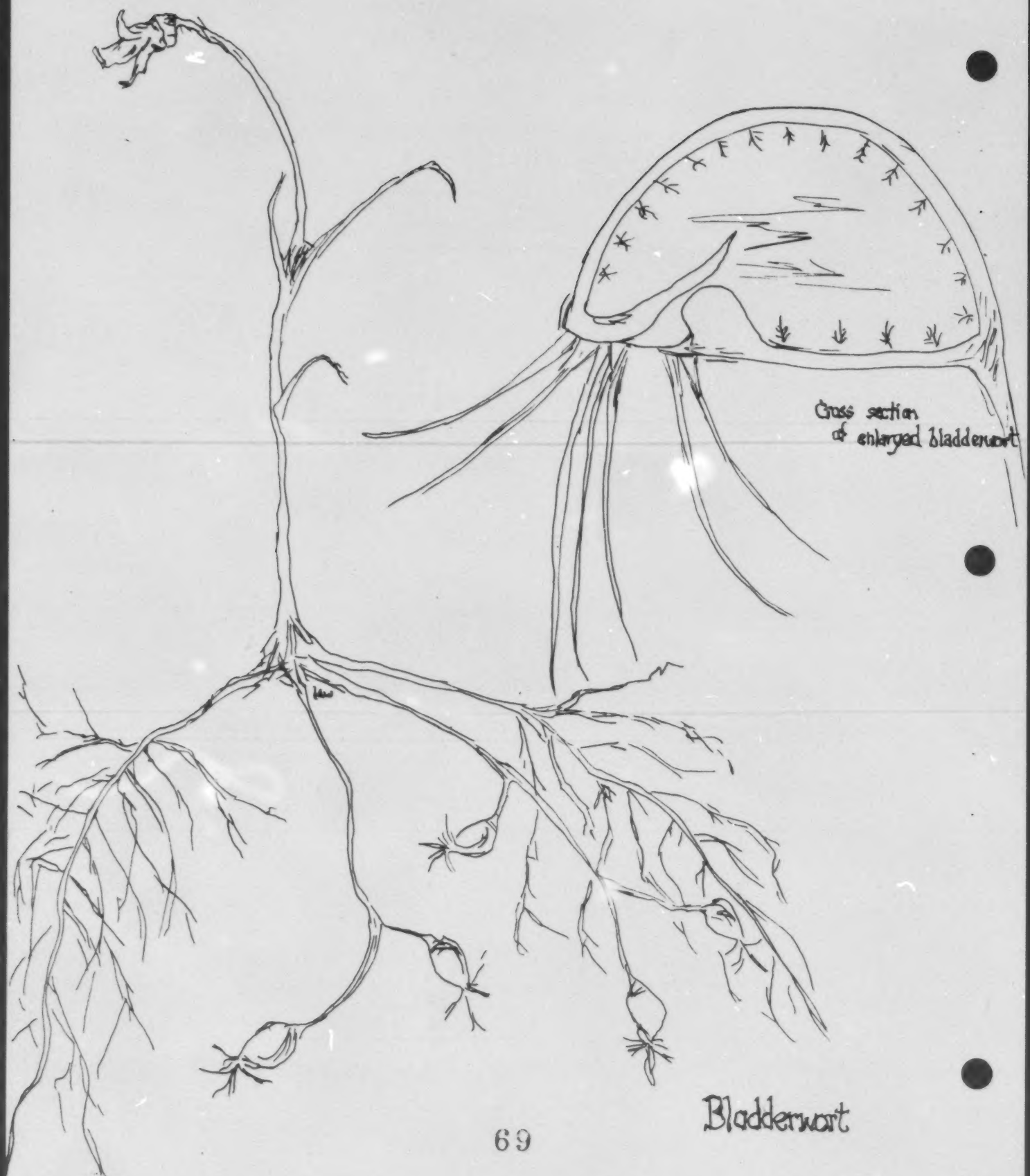
Sundew

67



Venus fly-trap

68



Bladderwort

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KUDZU:
AN INTRODUCED PEST

I. INTRODUCTION

As the story goes, back around the turn of the century, there was a farmer named C. E. Pleas who lived in Chipley, Florida. Mr. Pleas obtained this innocuous looking plant believing the oriental import would climb his trellis and provide him surcease from the hot Florida sun. When it failed to behave as he had hoped, he pulled it up and tossed it on the garbage pile. There it took root and grew and grew and grew . . and grew . . . and grew some more.

This is the legend of Kudzu (Pueraria lobata) the vine that is eating the south.

Three-quarters of a century after Pleas discarded his single plant it remains alive and troublesome. It chokes valuable stands of trees, shorts electrical wires, and even creeps up the sides of Atlanta's high rise buildings.

James Dickey wrote a poem about kudzu. It goes:

In Georgia, the legend
says
That you must close your
windows
At night to keep it out
of the house
The glass is tinged with
green, even so.

Mr. Pleas shipped some of his friends a few tendrils of kudzu. It seems that he had discovered the cows had a taste for the succulent leaves and vines of the plant. Some of his friends were in the soil conservation service and they found that the plant would prevent erosion if planted on the cuts of new highways and railroads.

Ollive Reeves, Georgia's Poet Laureate wrote "The Song of the Kudzu Vine." In part it goes:

Oh you may have watched the
black snake run
To the shady hole from the
blistering sun . . .
But until you've watched Kudzu
grow
You've never seen the fastest
show.

Pleas cannot be located to defend his role in the spread of kudzu. But this is not really the issue. The issue is how many acres of kudzu are out there today? The answer seems to be "more than last year."

Ridding the clutter of the vine is expensive and time-consuming. Electric utilities from Virginia to Louisiana spend thousands of dollars each year combating this weed.

According to Gayle . Buchanan, Professor of Agriculture at Auburn University, eradication is impossible. Control is a much better word. And even this is becoming harder and harder each year.

Mr. Channing Cope, Farm Editor of the Atlanta Constitution back in the forties when the "miracle vine" was still in good repute, calculated that a single acre if left along for a century would fill 13,000 acres. He ballyhooed this vine as the agricultural salvation of the South. He formed kudzu clubs and eventually persuaded 20,000 farmers to join up and plant the vine. But by the fifties when the danger became clear, it was too late: the fate was sealed.

Kudzu, as noted before, is useful in holding erosional areas that are too steep to seed. Large mine spoil areas are also beautified by the addition of the kudzu planting. It is furthermore a legume, and can be considered a green manure crop adding nitrogen to the soil - holding on road cuts, kudzu can be used as an erosion prevention in the waterways if care is taken to remember the prolific growth of the plant.

Full sun to partial shade are the preferred light modes. It will not grow into a broadleaf forest with dense shade. Soils of medium fertility are the best even though poor soils will grow fairly well. Kudzu will grow in fairly acid to neutral soils that are well drained. It is not tolerant of salinity.

A biological description might be: a high climbing, exceedingly vigorous vine with twining stems (no tendrils or aerial holdfasts.) The plant is a long-lived perennial legume. It has large trifoliate leaves occassionally the leaflets are coarsely lobed. Trailing stems tack down at the nodes and produce crowns at these points. Flowers are violet in loose hanging racemous clusters. Hairy brown, bean-like seed pods are borne in the fall, but sparingly and mostly on supported vines. The plant is generally regarded as a pest especially because of its tree climbing habit.

Gray's Manual of Botany describes the plant thusly:

Calyx with the two upper lobes united. Keel ascending or arcuate at tip, about equally divided wings; standary is suborbicular or obovate. Stamens monadelphous, with the axillary free at base. Legume flattish, continuous or with internal partitions, the ovules numerous, seeds sub-orbicular or transversly ovoid, compressed. High climbing libneous to herbaceous plants with pinnately 3-foilate leaves, the leaflets entire to palmately lobed, the stipule herbaceous, stipels subulate. Racemes simple or compound, axillary, the purple flowers fastened at the nodes of the rachis, the small bracts deciduous, braceteoles tiny. Flowers have the rich fragrance of grapes. Flowers are reddish-purple. Introduced from Orient and now range is S.E. states north to N.Pa. Rarely flowers n. of Va. Late Aug.Sept. Named for Swiss botanist, M.W. Puerari, 1765-1845.

The roots of kudzu are often intertwined allowing it its good anti-erosional powers. From the Handbook of Biological Data, the following table shows the size of the roots compared to other plants.

Species	Roots: Number				Roots Total Length cm.				Root Hairs diameter			Root Hairs Length		
	I	II	III	IV	I	II	III	IV	I	II	III	I	II	III
Fescue (Festuca commutata)									13	13	12	400	400	350
Kudzu vine (Pueraria hirsuta)	1	54	755		3	380	225		12	12	11	150	140	140
Soybean (Glycine soja)	1	51	470		260	1255	375	105	17	17	14	240	80	80
Composide dandelion (Taxaxacum offcinale)	1	180	900		30	720	360			7	7		130	130

Kudzu is a highly efficient nitrogen fixer, fixing at the rate of 49 kg/acres. The only legumes that do better are alfalfa- -88 kg/acre. sweet clover - 54 kg/acres, and lupine at 68 kg/acre. Data is from Handbook of Biological Data.

Reproduction is generally vegetative, the runners spreading and rooting at the nodes. These roots enlarge, become branched and fleshy, and form buds at the top, which when grown are called crowns.

Diseases affecting kudzu are a root rot fungus, Rhizoctonia solani mostly attacking small plants. Leaflets are commonly affected with halo blight caused by the bacterium Pseudomonas phaseolicola. The effect on kudzu is a small brown center, surrounded by a wide yellow band or halo. New leaves are so rapidly produced that the loss of a few of the older leaves is of little consequence. Another fungus Mycosphaerella puericola causes lesions on the leaves which are dark brown often with a yellowish margin. It is also susceptible to root knot nematodes, but is seldom damaged by them. Kudzu is found all over the orient and has been naturalized throughout much of the United States Southland. In North Carolina the distribution was as is shown on the map as of 1963.

Kudzu is a summer plant, the leaves dropping at the first frost.

Many people have planted kudzu. The soil conservation has even printed directions on how to get the best yield. The directions follow:

HOW TO DO IT

Land Preparation: Start preparing the land in winter by deep plowing or disking. All land preparation should be on the contour.

Fertilizer: Use 100 lbs. of complete fertilizer such as 3-12-6 or 2-12-12 for each 800 feet of row. Apply fertilizer at time of planting. Scatter stable manure in a furrow along the side of the plants. The kudzu plants should not come in direct contact with the manure.

Spacing: The distances between rows may vary from 6 to 25 feet, depending upon how quickly complete ground cover is desired. The plants should be set 3-1/2 feet apart in the row. For the 25-foot rows, 500 plants will be required per acre and around 2,000 plants for the 6-foot rows.

Planting:

a. Hand Method: Dig holes deep enough to accommodate the plant roots. Set the plants so that the top buds are a little lower than the general round surface. Pack soil firmly about the roots. Cover plant buds about one inch.

b. Furrow Method: Plant during late winter or early spring. Start by throwing 2 furrows together to form the row. (Locate rows on the contour on sloping land.) Place the plants, roots down in the furrow so they lean against the moldboard side of furrow and press dirt to roots with foot. The tractor wheel may be used for this purpose after throwing furrow on plants. Throw a narrow furrow on the plants so that the tops of plants are slightly below the ground level. Place fertilizer and/or manure in this furrow and cover. Continue plowing until a wide flat bed is formed. On sandy land the plant should be planted deeper and the plant buds covered 3 inches.

Maintenance: Cultivate the first year. In case of wide rows, cultivate crops may be grown between the kudzu rows. Where cultivation is impractical, hand chopping will be needed. Topdress each year with around 800 lbs. of 0-14-14 fertilizer. Before growth starts the third year, disc the land. Close grazing or mowing may kill a good stand of kudzu.

The planting has led to the great explosion of kudzu and the feeble attempts to control the vine. Chemical controls have been applied as well as mechanical harvesting techniques. An old farmer told me that the only way to get rid of it is to keep goats on it for a period of two years. They will really eat it down, he said.

The following is the suggested chemical procedure: It is by W. M. Lewis, W. A. Skrock, and H. D. Coble.

Weed	Herbicide and Formulation	Amt. of Formu-lation	Time of Application	Precaution & Remarks
Kudzu	2,4,5,-T (Various) 4 lb/gal.	1 to 15 gal./ 100 gal. of water	May 15 to June 15	Ester form is more effective. Use ester only if no susceptible crops are nearby. Retreatment at 6-week intervals will be necessary. 2-4-D and 2-4-5-T mixtures will work but not quite as effectively. Do not use 2-4-5-T around home or on ditch banks.

KUDZU IN N.C.

II. BEHAVIORAL OBJECTIVES:

1. To understand growth patterns as demonstrated by written explanation.
2. To recognize and identify the plant and its growth nodes. This is a laboratory practical-type exercise.
3. To understand the control technology as evidenced through the laboratory exercise and verbal explanation.
4. To determine and state in writing the concept of "introduced pest."
5. To understand the reasons for use as evidenced by an essay defending the process of planting as encouraged by Cope.

III. ACTIVITIES:

1. Grow kudzu in the lab and try various chemical controls (lab 1).
2. Try experiments (Lab 2) on vegetative growth.
3. Map kudzu in the school feeder area. Use a detailed map.
4. Research the effects on farms in this area.
5. Check into the economic effects of kudzu, check electric utilities' cost, homeowners cost, etc.
6. Are there or should there be any legal control over the spread of kudzu today?
7. Research and write a theme on "PLANTS GONE WILD."
8. What are the reasons that the deep South planted the vine? Were these justifiable?
9. Have a lab on the botanical aspects of the plant - - just observe, leaves, flowers, seeds, seed pods, etc.

IV. VALUES CLARIFICATION ACTIVITIES:

1. Shield of life. Design a "coat of arms" for Kudzu - - keep in mind what coats of arms show - -origin, family accomplishment, aspirations, ambitions, etc. Divide your shield into four parts, each one should represent an aspect of the plant.
2. Answer the questions:
   - Why was kudzu used in the first place?
   - What have been the effects of use?
   - Could something have been better?
   - What would happen ecologically if we were to destroy kudzu with pesticides, etc?
3. List the problems to the removel of kudzu. Rank them from largest (number 1) to the smallest.

LAB 1

Purpose: To determine whether or not various weed killers are effective on cultivated kudzu (Pueraria lobata), and at what strengths.

Materials: Kudzu
vermiculite or soil
various weed killers (2,4,5-T; 2,4,-D)
planting pots
sprayer or atomizer

Procedure: Prepare a series of 15 pots with kudzu. Kudzu will root from the nodes. Grow these for two weeks in moderate sun, watering adequately. Divide your pots into three groups. One group (A) will be the control, one will be treated with 2,4-D (Group B) and(Group C) will be treated with 2,4,5-T. Use the following techniques:
Spray each of the plants in Group A according to the regime - -

plant 1 spray 2 cc water
plant 2 spray 4 cc water
plant 3 spray 8 cc water
plant 4 spray 16cc water
plant 5 spray 32 cc water

The plants in Group B and C will be treated in the same manner except they will be sprayed with the pesticide specified for that group. For example, B-1 will get 2 cc of 2,4,-D, B-2 will get 4 cc of 2,4-D, etc.

Solutions of the weed killers will be prepared at the recommended dosages as found on Page 4 of the unit.

Prepare a table of your data as follows:

	GROUPS		
PLANTS	A	B	C
1			
2			
3			
4			
5			

Analyze your results.

FOR FURTHER STUDY: Consider small doses over a longer period.
One massive dose.
Mechanical means instead of chemical.

LAB 2

Purpose: To investigate the percentage of vegetative growth from nodes and internodal areas.

Materials: Kudzu vine
Potting media (sand and vermiculite)

Procedure: Take a vine and cut 3 nodal and 3 internodal pieces. Make sure that each piece has one entire leaf (3 leaflets) if there are more, remove them. Plant the cuttings into separate pots and water. Place in a shaded window so that the plant is in partial shade. Collect class data and work out the % growth from nodal and internodal pieces. Analyze using the chi square or the t-test.

FOR FURTHER RESEARCH: Use only leaves and check germination.
Try using plant hormones to see the effect.
Collect seeds and try to germinate them.

LIVING TOGETHER:
PLANTS AND ANIMALS

I. INTRODUCTION

If you had to pick one living thing to be saved from the destruction when the world ends, what would you choose? You might think green plants, but could they survive without animals to help with seed dispersal and aeration of the soil, or bacteria which are responsible for nitrogen fixation? What about the micro-organisms that carry out the process of decay? Could green plants live without them? What about the carbon dioxide that animals breathe out to be used by the plants? Could that be eliminated?

When considering such questions, one will likely realize that living things are interdependent. The three categories for interdependent living things in the environment are producers, consumers, and decomposers. These interdependent plants and animals live in a narrow band encircling the earth. This band, called a "biosphere," extends above the earth's surface 11.3 km. (7 miles) and below the earth's surface 9.7 km. (6 miles). Within this thin "layer of life" there are many complex communities, populations, food webs, and ecological successions. In addition all living things are dependent on the non-living components of the earth --water, air, minerals, and the like. Thus the web of interdependency grows.

II. BEHAVORIAL OBJECTIVES

At the conclusion of a successful encounter, students should be able to:

1. Recognize and discuss the various types of communities.
2. Understand the interdependence of living things and recognize the importance of the maintenance of the balance of nature.
3. Realize the importance of producers in relation to land ethics and providing for animals.
4. Understand the necessity of predators and the fact that producers must outnumber consumers.
5. Realize that the destruction of vegetation will force the animals in a community to leave.
6. Construct a food web and classify each component as producer, consumer or decomposer.

III. ACTIVITIES

1. Set up a natural community such as an aquarium in the classroom. Observe and discuss each part and what it contributes and consumes from the environment.
2. Using pint-sized jars with lids, fish, water and elodea, set up the following communities:

   Jar 1 - water, elodea, fish — Jar 1A - water, elodea, fish
   Jar 2 - water, fish — Jar 2A - water, fish
   Jar 3 - water, elodea — Jar 3A - water, elodea

   Place sealed Jars 1-3 in a cool but well-lighted window. Place sealed jars 1A - 3A in a dark place. Observe these altered communities over a period of 14 days. Discuss the reasons for any changes.
3. Take a mini-field trip around the school. Find as many natural communities as you can. Investigate to see if the altered communities can be corrected. If possible, correct the altered communities.

4. Take an ecological scavanger hunt. Give each student a list of about five things to look for. These could be either inside the classroom, school, or on school grounds. Each student must find organisms that illustrate interdependence. He should write down his examples and its location.
   a. Find two organisms that are symbionts. (lichen)
   b. Find a parasite and its specific host. (mistletoe and oak)
   c. Find a predator and its prey. (frog and bug)
   d. Find a herbivore and what it eats. (grasshopper and grass)
   e. Find a non-living thing that has an effect on an organism and its environment and tell what the effect is. (a rock is shelter for bugs.)
5. Compare as many communities as you can find around your school in the following way; amount of sunlight, average daily temperature, soil water retention, and soil fertility. How do these factors affect the plant and animal life?
6. Research the plant succession in the coast, piedmont, and mountains of North Carolina and in Mecklenburg County. How does the plant succession affect animal populations? How does land elevation affect plant succession?
7. Research natural and artifical population controls· for example, pesticides and insectivores.
8. Using specific examples of plants and animals, construct an aquatic and a terrestrial food web. Label each component as producer, consumer, and decomposer.

IV. VALUES CLARIFICATION

A. Role Playing

1. Have several students be talking plants and animals in a community.
2. Have several students be contractors and businessmen trying to clear the land for building purposes. Give the students enough notice so they can prepare logical reasons for their point of view. Present this to the class.

B. I Learned Statements

Prepare a chart with the following statements:
- I learned that I
- I re-learned that I
- I noticed that I
- I discovered that I
- I realized that I
- I was surprised that I
- I was pleased that I
- I was displeased that I

Have students volunteer to begin a sentence with one of the above and finish it with his own thoughts.

C. Personal Coat of Arms for North Carolina:

Give the students an outline of a coat of arms. Have the student answer the following questions. They may not use words in any answer except number six. All answers must be in the form of illustrations.

1. What do you regard as North Carolina's greatest ecological achievement to date?
2. What do you regard as Mecklenburg County's greatest ecological achievement?

3. What is the one thing that North Carolina's state government can do to make you happy?
4. What is Mecklenburg County's greatest failure to date?
5. If North Carolina would be destroyed at the end of the year and if she were guaranteed success in whatever she did, what would you suggest she do?
6. What three things would you like to be said of Mecklenburg County if it were destroyed today?

V. RESOURCES

Films:

Mojave Desert: Fragile and Enduring, National Geographic Films, Inc., color, 25 min.
Life in a Vacant Lot, EBF, color, 10 min.
Above the Timberline -- The Alpine Tundra Zone, NFBC, color, 16. min.
Life in the Woodlot, NFBC, color, 17 min.
Life on the Grasslands North America, EBF, b/w, 11 min.
The Cave Community, EBF, color, 13 min.
The Changing Forest, NFBC, color, 19 min.
The Marsh Community, EBF, color, 11 min.
Distribution of Plants and Animals, EBF, color, 16 min.

Books:

Biological Sciences: An Ecological Approach, Durst, Harold, et. als; Rand McNally and Company, 1973
Focus on Life Science, Charles Heimler; Charles Merrill Publishing Company, 1974.
Life Science, Milton Lesser, Amsco, 1967.
Man and the Ecosphere, Paul R. Ehrlich, W. H. Freeman Company, 1971.
The Biosphere, a collection of readings from Scientific American, W. H. Freeman and Company, 1970.

SOLUTIONS:

General Math and Environment

$\frac{+2}{4}$ $\frac{2}{12}$

% $\frac{24}{37} = \frac{x}{17}$

I. INTRODUCTION

Keeping the interest of the senior high general math student is no simple task. Word problems are especially difficult -- but designing word problems around subjects which are of interest to the students helps. Problems which are local in nature and involve environmental problems have some" holding power" for students. Math problems of the type in this encounter could possibly comprise an entire course -- or a great portion of one.

List of problems have been chosen to illustrate the types of things which can be done. This encounter is designed to span a long period of time and is not to be used as just one unit. The topics treated are the whole numbers, the rational numbers, the real numbers, percentage, measurement, and statistical measures and graphs. The amount of time spent on the environmental problems will differ from class to class, depending on the interests of the students and the time allowed.

The problems given are only sample problems. Many more would have to be developed in order to give the practice needed in a math course and to introduce a number of environmental topics.

II. BEHAVIORAL OBJECTIVES

At the end of a successful encounter, the students should be able to:

1. Solve problems and develop skills involving whole numbers, rational numbers, real numbers, percentages, measurements, and statistical measures and graphs.
2. Develop awareness of environmental problems and the role mathematics can play in their solutions.
3. More easily see the severity of pollution in the environment by working with statistical data.

III. ACTIVITIES

The activities below cover a broad range of topics in a general math course at the junior or senior high level. Each activity covers some specific area and sample problems of a local nature are given in each activity. A wide range of additional problems can be found in Environmental Education; Problems, Projects, and Exercises. Additional problems of a more specific nature can be found in the other resources or adapted from data in these resources.

1. Whole Numbers
   a. Assuming that the average amount of garbage disposed of each day by the citizens of Charlotte is five pounds and that the population of Charlotte is 350,000, how many pounds of garbage were thrown away in one day? in one week? in one year? How many tons would that be in one year?
   b. About ten gallons of water per day, per person is lost through breaks in pipelines. In one year, how much water is lost with no benefit to the people of Charlotte? (population 350,000)
   c. To meet the overall needs of the city of Charlotte, 150 gallons of clean water per person must be supplied each day. How much water must be provided for Charlotte each day? each week? each month? each year?

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2. Rational Numbers
   a. There are about 2½ Charlotteans for each vehicle in Charlotte. If there are 350,000 Charlotteans, about how many vehicles are there in Charlotte?
   b. If 2/25ths of the vehicles in the above problem are to be junked this year, how many vehicles are to be junked this year?
3. Real Numbers
   a. At the time of take-off, a four-engine jet plane pours out 88 pounds of air pollutants. If such a plane takes off every ten minutes from Douglas Airport, how many pounds of pollutants are poured out into Charlotte's air in one hour? in one day? in one week? in one year? Convert all answers to tons.
4. Percentage
   a. In 1960, the population of Charlotte was 201,564 and in 1970, it was 241,178. What was the percentage of population increase?
   b. In 1960, the population of Mecklenburg County was 272,111 and in 1970, it was 354,656. What was the percentage of population increase?
   c. There is a partial solution to the noisy garbage trucks of Charlotte. Trucks can be built with sound-deadening equipment for about $200 per truck. If Charlotte were to buy fifty such trucks, what would be the cost per taxpayer if Charlotte has 75,000 taxpayers? If the average taxpayer then pays $ 500 in taxes, what percentage would this be of his total tax bill?
   d. In 1920, the average waste per day per Charlottean was three pounds. In 1970 it was 5.4 pounds.
      1. What was the increase in pounds of waste per person during this 50 year period?
      2. What is the percentage of increase?
      3. If the percentage of increase remains constant, how many pounds of garbage will there be per person per day in the year 2020?
   e. If the number of automobiles used in Mecklenburg County increased 50% from 1966 to 1970, and automobiles contributed 400,000 tons of air pollution in the county in 1966, how many tons of air pollution were contributed in Mecklenburg County in 1970?
5. Measurement
   a. North Carolina contains approximately 1/50th of the area of the fifty states, and its area is approximately 53,000 square miles. The population of the fifty states in 1970 was approximately 203 million.
      1. What is the approximate area of the fifty states?
      2. What was the approximate average number of people per square mile in the United States in 1970?
   b. In 1970, the approximate population of Mecklenburg County was 350,000. What is the approximate average number of people per square mile in Mecklenburg County in 1970, if Mecklenburg County has 542 square miles?
6. Statistical Measures and Graphs
   a. Charlotteans throw away about five pounds of garbage per person per day. Devise your own symbol, and key to develop a pictorial graph showing the amount of garbage disposed of in one week by:
      a family of 4
      a family of 10
      Your class
      teachers in your school
      pupils in your school
      (make up three more of your own.)

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b. The average Charlottean uses sixty gallons of water per day in the home. The percentage breakdown is the following:

Flushing toilets	41%
Washing and bathing	37%
Kitchen use	6%
Drinking water	5%
Washing clothes	4%
General household cleaning	3%
Watering the garden	3%
Washing the car	1%

1. Make a circle graph to illustrate the above information.
2. Make a bar graph to illustrate the above information.

c. Using the percents given below, find the median, mode, and mean for the land area and population data.

	Land Area (in thousands of sq. kilometers)	Population (in millions)
Asia and Far East	15.6%	53.0%
Soviet Union	16.6%	7.3%
North America	15.9%	6.8%
Latin America	15.1%	6.9%
Rest of the World	36.8%	26.0%

IV. VALUES CLARIFICATION

A. I Learned Statements:

At the end of each day's work, the teacher should post the list given below as a means of reviewing the lesson. The teacher may have to complete several of the statements to get the class started. Although this is designed primarily for the environmental aspects, the mathematical aspects should also be brought out, thus, trying to incorporate the two.

-I learned that I . . .
-I relearned that I . . .
-I noticed that I . . .
-I discovered that I . . .
I realized that I . . .
I was surprised that I . . .
I was pleased that I . . .
I was displeased that I . . .

B. Percentage Questions:

Again, this will involve both mathematics and environmental problems, but it will also require the student to think more about the meaning and use of percentages. Students will write down their responses to the percentage questions as the teacher reads them out.

What percentage:

1. of your courses in school do you like?
2. of your allowance or your salary do you spend on gifts?
3. of your free time do you spend alone? with relatives? with friends? on homework?
4. of your time do you spend cleaning up your room? your yard? your neighborhood?
5. of your time do you spend doing something to improve your environment?

C. The Pie of Life:

This exercise is to be modified so that the student does not just visually divide a circle, but he is to use a protractor and change the percentages into degree measure, thus dividing the circle as accurately as possible by the use of mathematical skills. Have each student, by using a compass, draw a large circle on a sheet of paper and mark the center of the circle. The teacher will then say, "This circle represents a segment of your life. We will do several such pies. First, we will look at how you use a typical day. Now everyone please estimate how many hours or parts of an hour you spend on each of the following areas,

on a typical school day. Naturally, your answers will differ from one another."

How many hours do you spend:

1. On SLEEP?
2. On SCHOOL?
3. At WORK, at a job that earns you money?
4. With FRIENDS, socializing, playing sports, etc.?
5. ALONE, playing, reading, watching TV?
6. On HOMEWORK?
7. On CHORES around the house?
8. With FAMILY, including meal-time?
9. On MISCELLANEOUS other pasttimes?

Your estimates will not be exact, but they should add up to 24. Now convert the hours or parts of an hour to the corresponding degree measure and for the circle you have drawn, divide it into sectors using these degree measures and entitle each sector. Now report the exercise to represent your ideal school day instead of your typical school day.

V. RESOURCES

Books and Booklets:

Environmental Education: Problems, Projects and Exercises, North Carolina State Department of Public Instruction, Division of Science Education, 1972.

Environmental Quality, the First Annual Report of the Council of Environmental Quality, U.S.Government Printing Office, 1970.

Family Size and Society, (Text and Instruction Guide), Allyn and Bacon, Inc., 1972.

Geology and Ground Water in the Charlotte Area, North Carolina, H. E. Le Grand and M.J. Mundorff, U.S.Department of the Interior,1952.

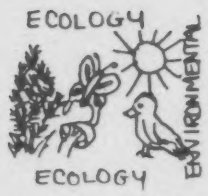
An Introduction to Population, Environment and Society, L. M. Schafer, Spaulding Copy Center, November, 1972.

Modern General Mathematics, Robert E. Eicholz, Phares G. O'Doffer, Charles F. Brumfiel, Merrill E. Shanks, Addison-Wesley Publishing Company, Inc., 1969.

The Population Challenge, U. S. Department of the Interior, 1970.

Population Dynamics, John Cairns, Jr., Rand McNally and Company, 1965.

SYMBIOSIS:
Living in a Real World



I. INTRODUCTION

To distinguish a plant from an animal is usually obvious, but sometimes difficult. In fact, there are some primitive species that make distinction impossible. Besides cellular differences, however, the one distinctive characteristic is how they feed: green plants need only inorganic substances and are therefore called "producers," while animals depend on prearranged organic molecules as well as inorganic minerals and are termed "consumers." But there are special groups of non-green plants that feed off other organisms by breaking down complex organic molecules. These "converters" are a vital link in the total process of life.

In our biosphere the interdependence of these organisms is more significant and sometimes more subtle than individual differences. All organisms are dependent upon each other in three major ways: 1) as a means of recycling energy and matter as demonstrated in food chains and food webs; 2) the survival of many species by pollination, seed dispersal, and protection (housing); and for 3) environmental quality: a-temperature control; b-erosion control and water quality; c-aeration of soil; d-aesthetic value.

Ignoring or intervening in the interdependence of all organisms in any way can affect the balance within any ecosystem.

II. BEHABIORAL OBJECTIVES:

After completing the encounter, the student should be able to:

1. Give examples of two food chains within a studied area.
2. Given a list of organisms:
   a. Construct a food web showing correctly the flow of enerby (see reference for activity I).
   b. Reproduce an energy pyramid to illustrate energy flow within a community.
3. Diagram and explain each of the following cycles:
   a. Nitrogen, phosphorus, and carbon.
   b. Hydrologic.
   c. Oxygen.
4. Identify at least five species of
   a. Insects that live in grass
   b. Insects that live in wooded areas
   c. Plants found in wooded areas.
5. Compare the diversity within a climax community with that of a successional community.
6. Explain the effect on plants and animals from man's disruption of a habitat.

III. ACTIVITIES

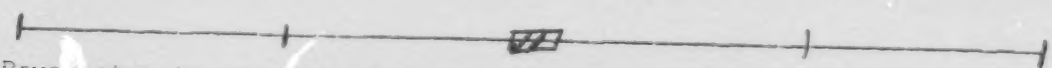
1. Use CIB Programmed Study on Community for background and information- pg. 157-170 (see Reference).
2. Visit a wooded area and/or school grounds and identify as many dependency relationships as possible. Look for such examples as:
   a. Food chains
   b. The spread of certain plant species by animals such as oaks by squirrels.
   c. Housing provided by plants as the saguaro cactus providing several nesting sites in the desert.
   d. Entire ecosystem such as a fallen log.

3. Set up pond cultures and observe succession over a three week period.
4. Chart and compare temperature on each of the following areas:
   (Be sure it is a sunny day!)
   a. Open non-vegetative area
   b. Open grassy area
   c. Woody area
   d. Weedy area
   (Choose a point or points the same height from the ground for taking temperatures.)
5. a. In the same four areas as No. 4, make 50 sweeps with an insect net. Weigh, identify, and count numbers or varieties of species.
   b. Determine what mammals could live in each area.
6. Collect or observe at a specified place
   a. 5 species of insects in:
      1. Field area
      2. Wood area
   b. 5 - 10 species of plants:
      1. Field area
      2. Wood area

   Note Pressed plants and/or preserved insects would be valuable.
7. Have groups (or individuals) make small aquaria/terraria to keep in the classroom. Continue taking care of them during the school year.
   Note: Very successful with basic students.
8. Visit an abandoned bulldozed area that has been standing a year or longer.
   a. Observe erosion pattern
   b. Note location, frequency, and kind of pioneer plants.
   c. Compare with an adjacent area that has not been bulldozed.
9. Remove all vegetation from an area one meter square. Observe and record numbers and species of plants and animals found in this area. Plant specimens should be pressed and fauna should be preserved. The following year, an adjacent area should be cleared. This sequence should be followed as long as practical, and changes observed should be recorded from year to year.

IV. VALUES CLARIFICATION

A. Continuum:
Draw two polar positions with two intermediate positions and indicate your position on each issue. This may be placed on the board - both issue and stand, or individually at seat.



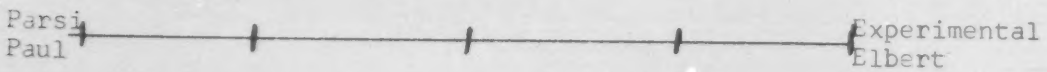
1. Paved streets are more desirable than unpaved streets.
2. Feeding birds makes them too dependent.
3. Streets should be widened to accomodate present traffic load.
4. It is wrong to cut down trees.
5. The city should spray to control mosquito population in summer.

B. Impact Statements:
To be posted without comment; discussion to take place at a convenient time, appropriate to the unit:
1. "Nature is loved by what is best in us . . ." Emerson
2. "I have faith in man's future . . . but it is faith in man as a part of nature . . . faith in man sharing life, not destroying it..."Marston Bates.
3. All living things are tied to their homes by a multitude of invisible strands.

4. Man is the only creature that seemingly stands aloof from the interaction of living things.

C. Values Level:

1. Would you eat a frog? Have you ever eaten one? If you were lost in the woods and were starving, where would you draw the line about what you would or would not eat? Would you eat worms, mice, any mushrooms? If a war came and you were starving, where would you draw the line about what animals you would eat? (Be sure you have shown film: Time of Man)
2. Parsi Paul believes that all life is sacred and no one should kill any living creature. He eats no meat, will not swat a mosquito and even steps around a cockroach. Experimental Elbert believes that the only way science can move ahead is to experiment on all living things, including people.(even if it means death). Where would you place yourself on a line between these two extremes, closer to Parsi Paul or Experimental Elbert? How do you feel about the killing of animals for mans' purposes?



V. RESOURCES

Books:

Valuing the Environment, Elementary, a Charlotte-Mecklenburg School Program.

Fundamental of Ecology, Odum, Eugene P., W. B. Saunders and Co.,1971.

Biological Science - An Ecological Approach, BSCS green version, Third edition, Rand McNally, 1973.

People and Their Environment, Teachers' Curriculum Guide to Conservation Education, Matthew J.Brennan, J. G. Ferguson Publishing Co.1972.

Manual of Field Biology and Ecology, Benton and Werner, Burgess Publishing Company, 1968.

A Forest Environmental Trail, Environmental Education Center, 13 Veterans Drive, Oteen, North Carolina.

CIB Programmed study on Community - Biology Curriculum Committee, 1972.

The Environmental Handbook, Garrett, DeBell, Editor, Ballentine Books, Inc., 1970.

Teachers Guide for Environmental Education, North Carolina Department Public Instruction, 1970, Chapter II, includes excellent bibliography.

Filmstrips: (Numbers are Environmental Center references)

13-15, " The Great Lakes," Life.
50, "Modern Biology: Environment and Survival," SVE.
71-75, "Interdependence of Living Things," McGraw, set of 6.
95, "Darwin's World of Nature," Life.
96-99, "The World We Live In," Life.
115-120, "Plant and Animal Relationships,"EB.
132-137, " Ecology: Understanding the Crisis," EB, recording included.

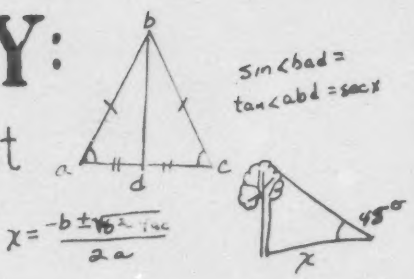
Films: (Available from Charlotte-Mecklenburg Schools)

"Food Chains in the Ocean," BFA, color, 10 min., Jr./Sr.
"Galapagos: Darwin's World Within Itself," EBEC, 20 min., Jr./Sr.
"Time of Man," The Ealing Corporation, color, 55 min., Jr./Sr.
"Two Days in Linville Gorge," Compliments of WBTV and Jefferson Production, color, 27 min., Jr./Sr.
"Adaptations of Plants and Animals," Coronet Films, color, 14 min. I
"Behavior in Animals and Plants," Coronet Films, Color 11 min., Jr.

"Mystery of Animal Behavior," I and II, Films, Inc.,color, 5[illegible] min. sr.
"Camouflage in Nature Through Form and Color Matching," Coronet Films, color, 11 min., I, 2nd edition.
"Classifying Plants and Animals, Coronet Films, color, 11 min., jr/sr.
"Simple Plants Algae and Fungi," Coronet Films, color, 14 min., jr.
"Fungi," EBF, color, 10 min., sr.
"The Changing Forest," NFBC, color, 16 min., sr.
"Trees-- How We Identify Them," Coronet Films, color, 11 min. I.
"The Community," EBF, color, 11 min., sr.
"Distribution of Plants and Animals," EBF, color, 16 min.
"The Cave Community," EBF, color, 13 min., sr.
"The Desert," EBF, color, 22 min.,sr.
"The Grasslands," EBF, color, 17 min., sr.
"The Sea," EBF, color, 26 min., sr.
"Temperate Deciduous Forest," EBF, color, 16 min., sr.
"Bear Grass Creek," FF, color, 20 min., jr./sr.
"Mojave Desert: Fragile and Enduring," National Geographic, F.I., color, 25 min., jr./sr.
"The Ecosystem: Network of Life," BFA, color, 103/4 min. (4-10).
"The Worlds of Dr. Vishniac," ETS, color, 20 min., jr./sr.
"Succession -- From Sand Dune to Forest," EBF, color, 16 min., sr.
Games: (Available from Environmental Center)
"Ecology," Urban Systems.
"Wildlife," E.S.Lowe, 2-5 players.
Program Kit:
"Predator Prey," Urban Systems.
"Our Environment Problem or Promise/" Nystrom.

TRIGONOMETRY:

Measuring the Environment



I. INTRODUCTION

Environmental problems and the study of math -- a natural relationship. Population growth studies, landfill capacity statistics, rainfall run-off, and the relationship to urban flooding -- all require the study of math.

The use of math skills to solve environmentally-related problems will help develop environmental awareness. In this encounter, problems in triangle trigonometry are given as examples of the types of problems which can be used. The e are merely a starting point-- for use by teachers in the development of ad tional problems. The use of hypothetical environmentally-related problems inc eases relevancy of the mathematics course, thus better meeting student needs and interests.

II. BEHAVIORAL OBJECTIVES

At the conclusion of a successful encounter, the students should be able to:

1. Solve problems by use of right triangle trionometry, the Law of Sines, the Law of Cosines, and the area formulas.
2. Develop awareness of environmental problems and the role which trigonometry can play in their solutions.

III. ACTIVITIES

1. Due to excessive weathering caused by the amount of sulfur oxide in the air, after only one year, Mr. Canipe's house needs painting. If he has a 22-foot ladder which touches a second story windowsill and makes an angle of 16° with the house, then how far is the window from the ground, and how far is the base of the ladder from the house? (Assume level ground).
2. In order to treat the Freedom Park lake for green algae, it is necessary to know the length of the lake from a point on one side of the lake a surveyer observes that the angle determined by his transit and points A and B at opposite ends of the lake measures 124°. How long is the lake if the transit is located 130 yards and 170 yards from points A and B respectively?
3. A tree growing in your backyard is infested with pine bark beetles to such an extent that it cannot be treated with pesticides. When the angle of elevation of the sun is 57° and the shadow of the tree is 75-feet long, how tall is the tree? If your house is at the edge of the shadow, is it possible for the tree to fall on your house?
4. A field of soybeans is to be crop dusted by plane. To give the best possible coverage the plane is to fly at an altitude of 150-feet. The angle of depression of the plane with the runway is 27°. How far is the runway from the field?
5. A SST pilot intends to fly from Charlotte to Seattle, Washington, a distance of 2,400 miles. He starts 15° off course and proceeds 500 miles before discovering his error. How much should he alter his course and how far must he fly to reach Seattle?
6. An apartment complex and shopping center are to be built on Central Avenue. At noon, simultaneous blasting is to be done on both sights. Your location at noon is such that you are at the vertex of an angle which passes through the two sights and you hear the blasting from the apartment at 2 seconds past noon and from the shopping center at 3 seconds past noon. How far apart are the two projects?

7. The York Road landfill is nearing its capacity and a replacement site must be found. One site being considered borders the northeast corner of Lansdowne. This site is in the shape of a parallelogram with sides of length 180 yards and 220 yards and included angle has measure of 70°. Find the area of the site.
8. Suppose that in the above problem the angle is not known, but instead the longer diagonal is 195 yards. Find the area of the site.

IV. VALUES CLARIFICATION

A. Values Voting:

1. How many of you favor treating the Freedom Park Lake to eliminate the green algae, although it may kill the fish?
2. Because of the danger to wildlife, how many of you are in favor of eliminating crop dusting and other techniques of pest control at the expense of lower crop yields?
3. How many of you favor banning the SST in the United States?
4. How many of you favor having a landfill so near your home?

B. Continuum:

1. Where would you place yourself on the following:

Ban the use of anything which pollutes the air ——— Eliminate clean air controls.

2. Where would you place yourself on the following?

Let construction companies clear land at will ——— Halt construction to save the natural landscape.

V. RESOURCES

Books and Booklets:

Environmental Education; Concepts, Activities, Bibliography, North Carolina State Department of Public Instruction, Division of Science Education, 1971.

Environmental Education: Problems, Projects, and Exercises, North Carolina State Department of Public Instruction, Division of Science Education, 1972.

Integrated Algebra and Trigonometry, Robert C. Fisher, and Allan D. Ziebur, Prentice-Hall, 1967.

Principles of Mathematics, Carl B. Allendoerfer and Cletus O. Oakley, McGraw-Hill, Inc., 1969.

Solid Waste Study for City of Charlotte and County of Mecklenburg, Henningson, Durham and Richardson, Inc., 1972.

ACTIVISM:
Legal Alternatives

I. INTRODUCTION

There are several kinds of actions which national, state, and local governments can take to halt environmental destruction. These governments can cooperate with one another to promote environmental protection programs and to pass and enforce strong antipollution laws. These governments can also sponsor environmental studies and make plans to improve the environment in the future. Government agencies can encourage the development of new techniques of production which are free from excessive pollution and noise. The American people can be helped to acquire new values which emphasize conservation of the environment and man's dependence upon the balance of nature.

The citizenry certainly must concern itself with the politics of environment. Hopefully, the activities involved will help students become aware of the situation.

II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

Following a successful encounter, students should be able to:

1. Know how legislation to regulate the environment affects the locations of industry, job opportunities, building of homes, tax structure, land value, law enforcement, interest rates, locations of parks and slums . (Two for each one.)
2. Know who to contact on the local, state, and national level concerning environmental management.
3. Know several responsibilities man has toward his environment.
4. Know that political involvement demands interest and action on the part of people, industry, and government.

B. Activities:

1. Have students develop an environmental responsibility sheets on the board showing the consumer's role, industry's role, and government's role toward the environment.
2. Start an ecological museum in your classroom or home.
3. Volunteer your services to people who deal with pollution control each day. If you are dependable you may be of real assistance to them. Report your experiences to the class.
4. Survey your neighborhood for cleanliness. If necessary, start a program concerned with this, organizing your friends in a clean-up campaign. This could be done for the school also.
5. Know how to contact environmental agencies associated with local, state, and federal government. Start locally with your city health department and continue until you reach our recently-created environmental agencies of the federal government.
6. Use the newspaper, magazines and other written or oral media to find out what is being done now. These clippings from newspapers and magazines can be used for a bulletin board.
7. Have your class visit a meeting of the city council or county commissioners and ask these invididuals about certain problems which exist and what might be done to improve them.
8. Investigate to find information on personal ownership of land, governmental ownership of land, and industrial ownership of land. On an average, now much of the land is kept in a natural state, or semi-

natural state? Who seems to be more concerned with environmental beautification? Historically, what has been the attitude of each of these groups toward the environment?

9. Have some students find pictures of an environmental nature in magazines or other printed materials for an environmental notebook. Some of the pictures should show pollution. Explanations of each picture would be necessary. Editorial cartoons may be used.
10. Use the Readers' Guide to Periodical Literature to find information on how legislation to regulate the environment affects the locations of industry, job opportunities, building of homes, tax structure, land values, law enforcement, interest rates, parks, and slums.
11. Have students gather information on governmental corruption relating to the environment on the local, state, and federal levels.

III. VALUES CLARIFICATION

A. Value Voting:
1. How many of you criticize the government when environmental problems crop up ?
2. How many have taken an active role in improving the environment?
3. Have you ever visited a city council or county commissioners' meeting?
4. What was the last article you read in the newspaper concerning the environment?
5. Are the lakes and streams around your area polluted?

B. Values Auction:
1. Here are seven items to be sold at an auction to the highest bidder. You must follow the rules: 1) you must not own any of the items; 2) you must have no more than $ 125.00 with you. 3) bids begin at $10.00; 4) you can spend no more than $ 60.00 on each item. On a separate sheet of paper, each student should record their highest bid and the highest bid for each item.

Items:
a) A 10-speed bike complete with every gadget imaginable.
b) An entire lot of your own (land).
c) A complete stereo set with tape player included.
d) 100 seedling trees of your own to plant anywhere.
e) A two-week back-to-nature trip in the mountains.
f) A chance to help organize a clean-up campaign for the inner-city.
g) A new motorcycle.

C. Values Game:
1. Have entire class participate in playing the Energy Environment Game made by Creative Studies, Inc., Boston, Massachusetts, Edison Electric Institute.

D. Value Helps for Understanding:
1. Governmental Responsibility.
a) Should the fight against pollution in the United States be fought on a national level, a state level, or a local level? Should the fight be the joint responsibility of national, state, and local governments? Give reasons for your answers.
b) What kinds of action can national, state, and local governments take to halt environmental destruction?
2. The Obligations of Industry.
a) Are many industries major sources of pollution?
b) Should businessmen assume the responsibility of paying for anti-pollution production methods? Explain your answer.
c) Should the people who buy the products of industry share some of this cost? Explain your answer.

3. The Concerned Consumer.
   a) In what ways are many consumers responsible for pollution?
   b) In what ways can consumers help to eliminate pollution?
   c) Will it probably be necessary for consumers to give up conveniences in order to fight pollution? What kinds of conveniences might they have to give up?

IV. RESOURCES

Books:

Air and Water Pollution, Gerald Leinwand, Editor, Washington Square Press, 1969.

Challenge and Change-- United States History: The Second Century, Ebling, Johnson and Perrone, Laidlaw Brothers, 1973.

Clarifying Values Through Subject Matter: Applications for the Classroom, Harmin, Kirschenbaum, and Simon, Winston Pres, Inc., 1973.

Dictionary of Ecology, Herbert C. Hanson, Bonanza Books, 1962.

Environmental Quality: The First Annual Report of the Council on Environmental Quality, U.S. Government Printing Office, August, 1970.

Essays on Community Life and Activities, Dimensions for Charlotte - Mecklenburg, February, 1974.

The Economic Impact of Pollution Control: A Summary of Recent Studies, Council on Environmental Quality, Department of Commerce, and Environmental Protection Agency, March, 1972.

The Environmental Handbook, Garrett De Bell, Editor, Ballantine Books, Inc., 1970.

CERAMICS:
A DIRTY ENCOUNTER

I. INTRODUCTION

Environmental economics tells us that the economy of a region depends on the utilization of its natural, human and cultural resources, and technology over-time. One of the most readily available natural resources within the Piedmont of North Carolina is the red, yellow, and blue clay which was the frustration of our grandfathers' farming career.

From the Indians who made ceramic cookware to the present, when North Carolina is rated as the brick capital of the world, our people have been involved, culturally and economically, with our soil. Today, in art, this same local clay is used for functional and decorative ceramics and for sculpture.

The fifties and sixties brought a plastic revolution, and many of the functional applications which ceramics formerly dominated, were augmented or almost usurped by the newer, more sophisticated media. The seventies, and the environmental concern for energy and natural resources has brought renewed interest in natural materials, including clay.

Plastic objects, are generally cheaper, more convenient, and have varied and interesting uses. On the other hand, plastics are not aesthetically pleasing, biodegradable and their production requires energy and utilization of scarce resources.

II. BEHAVIORAL OBJECTIVES

At the end of a successful encounter, the student should be able to:

1. Identify the commercial and aesthetic applications of clay.
2. Describe and participate in the technical steps involved in the ceramic cycle -- reclaiming, shaping, firing and glazing.
3. Recognize, appreciate and work with the intrinsic nature of clay as a sculptural media.
4. Use natural materials at hand to create something of value for various purposes.

III. ACTIVITIES

1. A sketch trip to one of the brick manufacturing companies in the area.
2. A field trip to the flower pot foundry in Matthews.
3. A demonstration of wheel-thrown work--professional potter.
4. A demonstration of hand-built techniques -- art teacher.
5. Creation of a functional and a decorative object using the following methods of construction:
   a. Pinch pot (weed pot)
   b. Coil
   c. Slab
6. Creation of a piece of ceramic sculpture.
7. Experiment with wheel-thrown pot.
8. Reclaim, shape, fire (load and learn about kiln), and glaze the piece of work.
9. Presentation of Indian pottern and Chinese ceramics.
10. Field trip to Mint Museum

IV. VALUES CLARIFICATION

1. Make a list of 20 objects you used yesterday.
   a. Star the ones made of plastic
   b. "X" the ones made of wood, clay, natural fiber.
   c. Draw a circle around the three you would miss the most if they were not available.
2. Finish the following sentence:
   The possession of material objects is _____.
3. Keep a sketch diary of design ideas and shapes.
4. Do a set of 25 different crayon rubbings from the art room.
5. Do a set of 25 different rubbings of natural objects found around the school.
6. Do a set of 25 different stamp designs for surface texture of clay (fingers, rocks, nails, etc.).

After each exercise, circle the five that have the most appeal to your tactile sense. Star the five that appeal to your visual sense. Draw a heart beside the one (or ones) you will use on your project.

A. Display

1. Plastic dish, china plate
2. Styrofoam cup; clay mug
3. Plastic flower pot; clay flower pot
4. Plastic countertop; vinyl floor covering; ceramic tile
5. Vinyl siding; brick
6. Plastic pipe; ceramic pot

Ask students to list 3 advantages of each in the sets; circle the one that appeals the most aesthetically; underline the one which they would probably purchase if they were:

   a. buying it now
   b. buying it when they were getting married
   c. buying it when they were 34, married with a family and making $ 23,000 a year.

Hold up plastic dish and china dish. Which one would you prefer if:

1. You were going to be working with the Peace Corps in a jungle in Brazil;
2. If you were going to be having your boss to dinner;
3. You were taking two toddlers and a puppy on a picnic;
4. You were celebrating your anniversary at a dinner club.

B. Plastic ash tray - - ceramic ash tray.

1. If you were decorating your living room;
2. If you were decorating your patio;
3. If it was given to you as a wedding gift;
4. If it were to be used in the ladies teacher lounge, in the male teachers' lounge.

C. Styrofoam cup vs. mug.

1. If it was to be dispensed from a drink machine;
2. If it was to be used in your home;
3. If you were packing it for a camping trip.

D. Plastic counter cover -- vinyl floor covering -- clay tile.

1. If you were going to have to be cleaning it when it was new;
2. If you were going to be cleaning it when it was old;
3. If you dropped a dish on it;
4. If you dropped a sharp knife on it;
5. If you left a lighted cigarette on it.

V. RESOURCES

Sources:
Kendrick Brick and Tile Company
Mint Museum
Matthews Foundry
A practicing potter (call Guild of Charlotte Artists)
Slides - Indian Pottery - Nature Museum
Slides - Chinese Pottery - Nature Museum

CONSUMER ECOLOGY:

Cut Down on Wastes

I. INTRODUCTION

The American consumer actually consumes nothing; he merely uses things, and though he burns, buries, grinds or flushes his wastes the material survives in some form and technology adds to its longevity. We have created such volumes of solid waste that our vision has been obscured to the fact that nature creates no junkpiles. If you would take a walk around your neighborhood, you could observe the buldging trash cans behind each home and place of business. Remember the last time you took a walk through the woods or a meadow. Did you notice that all the dead organic things were being decomposed? Our disposable society ... throwaways, excessive packaging, paper, plastics, and cardboard . . . produces on the average five and one half pounds of solid garbage per day per person. By 1980 it is estimated that this amount will increase by three pounds per day.

Disposing of wastes is a complicated process involving individuals, homes, institutions and cities. Many municipalities have the following as major expenses: schools, roads, and waste disposal. Many areas, especially where there is no garbage collection, still use archaic methods of waste disposal such as burning. This causes pollutants to be added to the air.

The method of waste disposal in Charlotte is collecting the garbage and carrying it to a sanitary land fill. At a land fill the solid waste is covered daily with soil. Several progressive cities are experimenting with ways to recycle organic wastes as fuel. Many businesses and institutions are now being forced to recycle goods such as paper and metal products.

Our waste disposal problems are complicated by the advertising industry encouraging us to seek the " good life" with all of the "modern conveniences".. "Enjoy coke in the new resealable disposable bottle" and similar adds blare at us from T. V. , radio and magazines. Usually we pay a high price for these conveniences . . . litter.

Our "litterbug phobia" can be solved by attacking the problem from two angels: (1) cut down on the throwaways at the source and (2) instill in citizens a reuse, remake, recycle attitude so that individuals are conscious of waste and make every effort to reuse and recycle it.

II. BEHAVIORAL OBJECTIVES

1. Identify sources of solid waste.
2. Discuss several methods of disposing of wastes and the environmental impact of each.
3. Discuss problems incurred by disposing non-biodegradeable wastes.
4. Describe methods of disposing solid wastes at school, at home, in public places.
5. Suggest alternative methods for cutting down wastes.
6. Suggest alternative methods for disposing of solid wastes.
7. Discuss the role of advertising in creating a variety of pollution problems.

III. ACTIVITIES

1. Survey your classroom and cafeteria. Where does trash go when it leaves school? Find out about the jobs of the people who process the trash. Could these wastes be recycled?

2. Keep a daily record of the trash produced by the students in the seventh grade. Divide the trash into categories according to composition. Then into categories of reusable and non reusable trash.
3. Survey your home. How many members are in the family? How many garbage cans a week are filled? Mathematically figure the average weight of garbage each member of your family produces each week. Examine the weeks groceries as they are taken from the grocery bag and put away. Notice the types of packing. List all items that are wrapped with paper more than once.
4. Study ways to:
   - reduce the amount of solid wastes.
   - reuse materials and items rather than throw them away.
   - recycle materials.
5. Sponser a beautify by recycling campaign.
6. Write a paper relating the following statement to the U.S. Consumer. "If fools went not to market bad wares would not be sold."
7. Read "Cleanest Shirts in Town" by Art Buchwald.
   Discuss the following:
   a. What were the ladies a victim of?
   b. The main concern of the women.
   c. How does advertising influence us?
   d. Which comes first supply or demand? That is are we "sold" products on demand or does advertising first make us feel a need for the product?
   e. What didn't Mrs. Holbrook realize?
   f. Are Mrs. Holbrook and Mrs. Murphy really typical housewives?
   g. Why is this society so hung up on white laundry?
8. Search through various advertisements and find at least three that are pushing consumption to a greater extent than you feel necessary.

IV. VALUES CLARIFICATION
1. If you could change one thing about consumers what would you change? If you could change one thing about advertising what would you change?
2. Continuum: Have students rank themselves and family members on the following continuum.

Returnable Ron

He uses only returnable containers and will not eat or drink anything that comes in a throwaway container.

No-deposit Norris

He uses only non-returnable containers because he thinks that returnables are too much trouble to take back.

V. RESOURCES

1. Bock, Alan, Ecology Action Guide, Nash Publishing, Los Angeles, 1971.
2. Bough, Arthur S., Man and the Environment, The Macmillian Co., New York, 1971.
3. Britt, S. H., The Spenders, McGraw Hill, New York, 1960.
4. Gerald, Leenwald, The Consumer, Washington Square Press, New York, 1970.
5. Snyder, Ernest W., Please Stop Killing Me, Mentor and Plume Books, Inc. New York, 1969.
6. Froelstrup, A.W., Consumer Problems and Personal Finance, 3rd ed. McGraw Hill, New York, 1965.
7. U. S. News and World Report, How to Stretch Your Income, U.S.News and World Report Books, Washington, D.C., 1971.
8. Veblen, Thorstein, The Theory of the Leisure Class, Viking Press, New York, 1912.
9. "The Age of Affluence", Time, The Weekly Newsmagazine.

CRAFTS:

A Return to a Simpler Life

I. INTRODUCTION

Andy Wardhol's painting of the Campbell's coup can smybolizes the mid-century American culture in which it was painted. Industry has been mechanized and mass production seems to turn men into machines. Our comings and goings are imposed with a machine-like regularity. The making of things has turned into repetitious drudgery whether it is canned biscuits or a row of houses. Objects are rarely natural or even man-made; they are machine made.

The cost of living in our plastic wrapped, untouched -by-human-hands environment is the loss of our own human identity. Machines don't have feelings. Machines don't have a need for self renewal. People do.

Machines are efficient, and their use has made it possible for us to have time left over after providing for our physical needs. During this leisure time man often turns inward searching for self renewal. This turning inward can be stimulated by external esthetic experiences and by opportunities to experience and enjoy nature. Esthetic resources and recreational facilities of economic and non-economic value are becoming increasingly important in leisure-time activities.

Families are choosing to go camping. Bike riding has become a fashionable mode of transportation and exercise. Tennis courts have to be scheduled in advance, and the waterways resemble a freeway during the peak weekend and holiday hours. You can now find the middle-aged businessman, as well as the high school track star, jogging in the early morning hours.

The fine arts have moved outdoors as well. Rock concerts, bluegrass festivals, and outdoor dramas have joined the band concerts and parades. Art and crafts have also become more important within the lives of the people. An art object or a craft object is man made. The housewife is finding that crewel work on a cushion satisfies the need for creation as making yeast bread did in the past. Macrame has come out of the museum, and quilting is a part of the high school art curriculum.

II. BEHAVIORAL OBJECTIVES

Following a successful encounter, students should be able to:

1. Recognize the need for man to turn inward for self-renewal.
2. Recognize opportunities to experience and enjoy nature.
3. Recognize the stimulation of external aesthetic experiences.

III. ACTIVITIES

1. Field trip to parks - planned recreational Park - Park Road urban park - Marshall Park amusement park - Carowinds.
2. List at least ten drugs of all types that you know about:
   Examples:
   1. Pot
   2. LSD
   3. Nicotine
   4. Alcohol
   5. Speed
   6. Caffiene
   7. Aspirin
   8. Heroin
   9. MDA
   10. Opium

   Then have students do the following:
   a. Star the drugs in the list that you think are most dangerous.
   b. Put a check beside the drugs that you feel are least harmful.

c. If you were forced to use three, rank with numbers the three that you would use.
d. Rank by using a, b, c the three that one of your parents would probably use.
e. Write a statement about your feelings toward drug abuse.

DISCUSSION:
Then discuss what drugs were on the list, which were considered most and least harmful, which would be taken, and feelings about "drug abuse."
You then might discuss what factors influence our decisions and beliefs and list these on the board as students suggest them.

IV. VALUES CLARIFICATION

A. Keep a diary of leisure-time pursuits of family for 2 weeks.
yours — father's
mother's — family

B. Contracts
1. Self contracts - productive use of aesthetic or natural resources.
2. Class contract - example planting trees, cleaning up creek, etc.

C. Experiment with sensuous experiences - different kinds of food, trust walk, taped natural sounds, taped mechanical sounds, description of fight scene and participants, "Two Ideal Days" - emphasis on sense perceptions and aesthetic encounters.

D. Twenty Things
1. Make a list of 20 machines found within the home. Mark through the five that you could live without most easily.
Star the five that you would miss the most.
Rank these five in their order of importance to you.
Finish the following sentence: If you made a "Nancy" machine, it would probably _____.
2. Make a list of 20 things that you have done within the last month.
Make a list of 20 things that you have done with your family in the last three months.
Star aesthetic (sensuous) and natural (nature-related) experiences.
3. Twenty Things I love to do:
You might want to think in terms of leisure-time pursuits.
**Star the ones that are free.
Put an F by the ones that you do with your family.
Put a daisy by the ones that would be of interest to an environmentalist
4. Try These:
Ten things your mother loves to do.
Ten things that your father loves to do.
Ten things that you loved to do five years ago.
Ten things that you think that you will love to do five years from now.
***Use the same set of ideas and symbols as above.

E. Situations:
Plot your reaction rate, either positive or negative, on a 1 to 8 scale.
1 - - "blah"
8 -- a screaming yes or no.
1. A heart surgeon refuses to operate on anyone who will not stop smoking even though he is the only one skilled enough in the field to perform certain operations.
2. An environmental education teacher lives in an air-conditioned home, drives an air-conditioned car, and races dragsters on the weekend as a hobby.

3. A grocery store manager has the stock boy to put a few older onions into the pre-packaged bags.
4. A pet store owner sells kittens which have been exposed to an extremely contagious and fatal disease.
5. A cookware salesman tells people that anything other than his stainless steel will cause cancer.
6. A group of backpackers leave their empty V-8 cans on the trail.
7. A judge, who had a cocktail party the night before after which three people drove home drunk, throws the book at a kid busted on a possession charge.
8. A young woman gets pregnant in hopes that the baby will help her husband to settle down and save their shaky marriage.
9. The city stops mowing the parks and right of ways in order to encourage growth of wildlife population, and the newspaper prints an editorial on the unsightliness of the unattended areas.
10. A city builds a new freeway but refuses to put in sidewalks on existing streets or to make a bike land because of lack of funds.
11. A city builds a public housing complex for families in the downtown are where there is no existing or planned recreational areas available. (Before building the multi-family dwellings, all of the trees had been cut down, and the apartment buildings are extremely close to the street.)
12. In the midst of a canning jar shortage the production and consumption of soft drinks in no-return bottles is up.
13. In the midst of a paper shortage each student is given an average of four mimeographed sheets of paper a day and the writing on each covers only one-half of the page.

F. Are you more like - -

a ten-speed bike	or	a motorcycle
a duck	or	a peacock
Fruit Loops	or	Grapenuts
a rose	or	a wildflower
guitar	or	a cello
a china cabinet	or	a liquor cabinet
Melmac plate	or	a fine china plate
Ceramic mug	or	styrofoam cup
red light	or	green light
dog	or	a cat
play or a movie	or	a movie
a key	or	a lock
the beach	or	the mountains
a Hardee's hamburger	or	a charcoal broiled steak
corn-on-the-cob	or	creamed corn
an oyster	or	a flounder
a riding lawn mower	or	a push mower
a jean jacket	or	a fake fur
Rolls Royce	or	a Model T
telephone	or	a dictaphone

G. Are you Someone Who . . . .

Y N M 1. will you become involved in growing your own garden when you have your own family?
Y N M 2. is likely to practice natural childbirth?
Y N M 3. will watch a lot of television at age forty?
Y N M 4. will subscribe to Playboy magazine?
Y N M 5. is likely to get fat someday?

Y N M 6. would like to go hiking on the Appalachian Trail someday?
Y N M 7. likes to go for a walk in the country?
Y N M 8. likes to go for a walk in the city?
Y N M 9. knows almost nothing about birth control?
Y N M 10. would rather live in an apartment than on a farm?
Y N M 11. will drive too fast?
Y N M 12. makes some of your gifts?
Y N M 13. will never go to a beauty parlor? (girls)
will not marry a girl who goes to a beauty parlor regularly? (boys)
Y N M 14. will change your hair color several times in your life?(girls)
will marry someone who changes her hair color? (boys)
Y N M 15. believes that natural foods are the only way to go?
Y N M 16. will never have as much money as you want?
Y N M 17. reads books just for fun?
Y N M 18. is very materialistic?
Y N M 19. has to have a radio or records or TV playing when you study?
Y N M 20. likes thunderstorms.
Y N M 21. will use disposable diapers when you have a baby?
Y N M 22. likes to eat?
Y N M 23. will never hire a cleaning lady?
Y N M 24. will refuse to live in a housing development?
Y N M 25. locks all doors and windows when you are alone in the house?

H. Would You Rather:

1. go on a camping trip	or	take a guided tour
2. be told what to do	or	make up your own mind
3. go horseback riding	or	watch your favorite TV show
4. believe the facts	or	experiment on your own to find out the facts
5. take a run bath	or	go swimming
6. eat a Hardee's hamburger	or	eat homemade spaghetti
7. go bike riding	or	ride in a car
8. play it safe	or	take a chance
9. play tennis	or	read a book
10. have a bell rung to remind you to go to class	or	take the responsibility of getting to class on time without a bell
11. feel "safer" with rules	or	feel closed in with rules and regulations
12. be dependent upon yourself	or	be more dependent on someone else or a group
13. paint a picture	or	go to a museum
14. go to a football game	or	play cards with your friends
15. breathe polluted air	or	have a fuel crisis
16. live in a recreational community (Raintree)	or	live on a farm with horses, lake, etc.
17. grow and process your own produce	or	depend on air-conditioned "muzac supermarket?

I. Rank Order: Would You Rather

_____go to a football game
_____watch a football game on TV
_____play a game of touch football

_____work on a car
_____go hunting
_____run track

_____paint a picture
_____buy a painting
_____visit a museum

_____go to a friend's house
_____go to the river
_____go to a party

_____take a picture of a tree
_____plant a tree
_____climb a tree

_____make a cake from scratch
_____make a packaged cake mix
_____buy a cake at the bakery

_____eat homemade cookies
_____eat bakery cookies
_____eat packaged cookies

_____live in the city
_____live in the country
_____live in the suburbs

_____pick cherries
_____make a cherry pie
_____drive a truck carrying the cherries to market

_____complain about a polluted creek
_____help clean up a polluted creek
_____ignore the polluted creek

_____work on an assembly line
_____clerk in a department store
_____be a farmer

_____grown your own vegetables
_____buy fresh vegetables at the supermarket
_____buy canned or frozen vegetables

_____go to a movie
_____watch a movie on TV
_____go to a play

_____go to a shopping center
_____go to the park
_____participate in church activities

_____walk to school
_____ride your bike to school
_____ride your motorcycle to school

_____carpool to school
_____ride a bus to school

_____read a novel about death
_____watch a TV show about death
_____listen to records about death

_____take a walk in the city
_____take a walk in the country
_____ride everywhere

_____write a poem about nature
_____read a poem about nature
_____go to the wilderness and commune with nature

_____sew
_____make cookies
_____babysit

HUMAN SUCCESSION:
The Utterly Dismal Theorem

I. INTRODUCTION

A persistent question of those concerned about environmental problems is a very basic one -- Can mankind survive on earth? For most it is a rhetorical question. None of us expects to be counted among the last men on earth. However, this very basic question maybe the ultimate one in examining environmental issues. Is it possible for man to live in harmony and in balance within the earth's natural environment? -- or does the very nature of man dictate that he will alter his environment in such a way that he will eventually doom himself to extinction?

Many environmentalists cite statistics regarding pollution and scarcity of resources and assuming that rational,educated men will "change their ways" and save themselves from destruction. Others are not so optimistic. Those who espouse the "Utterly Dismal Theorem"[1] believe that man is a successional creature. He is a primary organism in a successional chain --one that alters the environment so that he cannot survive. They compare man's position to that of the asters or pine trees in an old-field succession. Asters grow for a season -- yet "poison" the soil so that the next year asters cannot grow in the same place -- thus they are replaced in the successional chain. Pine seedlings need bright sunlight in order to grow. As a pine forest matures the large pine trees shade out the pine seedlings. Young hardwood seedlings -- oak and hickory -- begin to take over for they thrive in a shady environment. As the mature pines die, they are replaced not by younger pines but by hardwoods. Since the oaks and hickories do not adversely affect their own seedlings through shading, they remain as the climax organism in this successional chain-- reproducing and populating the forest.

Supporters of this theory suggest that man is not the climax organism in the earth's successional chain. While man dominates at this moment in time, he is altering his environment just as asters and pines alter theirs. At some future point in time, man will become extinct giving way to dominance by another organism -- perhaps a climatic dominance!

Supporters of the "Utterly Dismal Theorem" cite several cultural examples to support their contention. One example is the culture of the Anasazi ---- the so-called "cliff-dwellers" of the Southwestern United States. Examining the Anasazi is a vehicle for examining the broader question of man's ultimate survival.

Those who feel that man is on a path to extinction note that the Anasazi developed a farming culture in an area where water was limited. Population growth resulted in increased demand for water. Periodic drought reduced water supplies for farming. The Anasazi were forced to leave the area. Unlike the Anasazi, modern man has no where to go when his present environment can no longer support him!

The study of this Indian culture is at variance with the popular notion that the Indian lived in harmony with the land and with nature. Many environmentals go so far as to recommend that we abandon current standards of living and return to the more natural, Indian way of life.

The Anasazi, or "old ones," lived in the "Four Corners" region of the American southwest. (Utah, Colorado, New Mexico, and Arizona) At the height of their cultural development they built impressive cliff dwellings, the ruins of which dot the southwest today. Among the most famous of these ruins are those found in Mesa Verde National Park near Cortez, Colorado. The people who inhabited Mesa Verde are the focus of this encounter because of easy access to information on them. However, one could just as easily study the people of

Canyon de Chelly, Chaco Canyon, or Aztec Pueblo - not to mention others. Their stories are essentially the same.

Today's Pueblo culture (the Hopi, the Zuni and other Southwestern Indians) contains elements which resemble those of Anasazi culture. Archaeologists and anthropologists suggest that the Anasazi may have migrated southward when they abandoned their cliff dwellings about 1300 A.D.

Information used in this introduction was drawn from Indians of the Mesa Verde by Don Watson. The time periods and descriptive terminology he uses generally conform to those found in other archeological accounts.

One of the basic questions with which one must deal is why did the Anasazi try to farm in the Four Corner's area? Most authorities agree that, originally, the people were hunters. Farming was developed gradually, over the centuries farming became the mainstay of the economy and hunting became supplemental. Apparently the people did not choose to move from their original environment as their culture changed. They did not move until the environment would no longer support their culture.

The area in which Mesa Verde is located has various climatic characteristics caused by exposure, land forms, and elevation. The mesa tops and foothills are considered semi-arid, while the surrounding valleys and plains are arid. Temperatures also vary. Oddly, the growing season on Chapin Mesa (part of Mesa Verde) is 167 days compared to only 110 days in the Mancos Valley immediately below.[2]

As the early Anasazi hunters became more dependent upon agriculture they moved to places where a longer growing season would insure a better crop -- thus the move to the Mesa.[3]

The climate of Mesa Verde is wet enough to provide a moderate supply of water, but it requires intensive development of all available resources. Both primary and secondary sources of water depend upon rainfall and snowfall. an average drought conditions occur in this area about 12 times per century. The end of the 12th century, however, began a drought of almost 100 years. The last quarter of the 13th century has been called the "Great Drought."[4]

This is when the people of Mesa Verde abandoned their cliff dwellings and left the area. They had had their "golden age" -- building large pueblos of great beauty. They had prospered and their population had grown, but alas, the larger population put a great strain on the water supply. In spite of elaborate systems devised for the storage and utilization of water, the Anasazi could not withstand the severe shortages of the great drought.

Could they have survived had they been hunters? Probably not, evidence implies that the drought was severe enough to drive game from the area -- so hunters would have been forced to migrate as well.

This encounter will lead the student through an examination of the environment of the Anasazi, their impact on it, and an examination of their own views regarding man's relationship with nature.

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1. Dr. Cyril Harvey, Guilford College.
2. Mesa Verde: A Study of Man in an Agricultural Setting, Charles F. Kettering Foundation, August, 1966. (ERIC-EDO 54034 -54035)
3. Ibid. p. 2
4. Ibid. pp.3,4.

II. BEHAVIORAL OBJECTIVES

At the conclusion of a successful encounter the student should be able to:

1. Demonstrate through a written test factual knowledge of the way in which the Anasazi interacted with their environment.
2. Demonstrate verbally their own beliefs and values regarding the survival of mankind - by reacting to value strategies which reflect the "Utterly Dismal Theorem."
3. Make a judgement regarding the reason's for the decline in the Anasazi culture and affirm this opinion through written and oral activity in class.

III. ACTIVITIES

1. Slides. Show students slides of ruins and museum displays at Mesa Verde National Park. Using the attached questions, lead students into a discussion of the culture and environment of the Anasazi.
2. Relief Map. Using a relief map of the Four Corners Area, have students answer questions regarding the basic geography of this environment. (See appendix.) The short article regarding the climate of this area (ERIC) might also be useful as a reference for discussion.
3. Background reading All students should be given copies of the outline notes based on Chp. 10 in Watson's, Indians of the Mesa Verde. This should serve as basic background for all students. Students should also be assigned readings from the following sources. The articles are of varying degrees of difficulty and selection should be based on the ability of the students in the class. (See appendix for Study and Discussion questions based on the readings.)

Osborne, Douglas, "Solving the Riddles of Wetherill Mesa," National Geographic, Vol. 125, No. 2, Feb.1964, p. 155-194. (This is a very interesting and readable account of the archeological work at Mesa Verde and what it reveals about Anasazi culture.)

Lister, Robert H., "Archeology for Layman and Scientist at Mesa Verde" Science, Vol. 160, No. 3827, May 3, 1968, p. 489-496. (This article is somewhat more technical but gives a good history of archeology at the site and the way in which various disciplines have worked together to reveal information.)

Terrell, John U., "Anasazi; the Old Ones," American Indian Almanac, World Publishing Co., New York, p. 18.

IV. VALUES CLARIFICATION

A. Rank Order:

1. If you could choose any life style at all which could it be?
   a. hunting for a living
   b. Working in a traditional, middle-class job
   c. become a self-sufficient small farmer.
2. Which of the following statements best represents your beliefs about the future of mankind.
   a. Man is doomed. Pollution will increase and mankind will become extinct. Nothing can save us.
   b. Man is the earth's most intelligent creature. He can and will make new discoveries which will solve our environmental problems.
   c. Mankind cannot survive indefinitely but he can, through population control and proper environmental practices prolong his existence and improve the quality of life.

B. Values Clarifying Discussion:

Be sure students understand the "Utterly Dismal Theorem" and its implications for mankind. This challenges many of our ethical foundations and

beliefs about mankind. Students should be encouraged to express their feelings. Do they believe in the theorem or not? If all people accepted this what might be the result, etc.?

C. Values Voting:
1. How many of you feel that one person can really help to solve environmental problems?
2. How many of you feel that tax laws should penalize families with more than two children?
3. How many of you feel that laws should be passed to regulate the number of people who can live in any given area?
4. How many of you feel you could adapt to a simpler life style than that which you now have?
5. Would you vote in favor of foreign aid to buy food for over-populated countries?

V. RESOURCES

Visuals:
1. Slides of Mesa Verde National Park - available from Environmental Education Center, Charlotte Nature Museum.
2. Relief map of Mesa Verde, Hubbard Scienfitic Company. Available from Environmental Education Center, Charlotte Nature Museum.

Articles:

Lister, Robert H., " Archeology for Layman and Scientist at Mesa Verde," Science, Vol. 160, No. 3827, May 3, 1968, pp.489-496.

Osborne, Douglas, "Solving the Riddles of Wetherill Mesa," National Geographic, Vol. 125, No. 2, Feb.,1964, pp. 155-194.

Terrell, John U., "Anasazi: the Old Ones"American Indian Almanac, World Publishing Co., New York, pp.18-20.

Books:

Ceram, C. W. , The First American, Harcourt Brace Jovanovich, Inc., New York, 1971.

Watson, Don, Indians of the Mesa Verde, Mesa Verde Museum Association, Mesa Verde National Park, Colorado.

VI. APPENDIX

A. Study and Discussion Questions.
The Climate and Geography of Mesa Verde. (use with relief map and article on climate and see reference in footnote # 2)
1. What is the elevation of Mesa Verde? How does this compare with the surrounding area?
2. What affect might this elevation have on climate?
3. What is the average temperature of the area? The length of the growing season?
4. How much rainfall does the mesa receive? How would this affect life in the area?
5. What would be best way to earn a living in this type environment?
6. How did the Anasazi earn a living? What impact did they have on their environment? What impact did their environment have on them?

B. Study and Discussion Questions.
Article - "Solving the Riddles of Wetherill Mesa," Douglas Osborne, National Geographic, Vol. 125, N . 2, Feb. 1964, pp.155-8.
1. In what way have various sciences contributed to the archeological study on the Mesa? Give some specific examples.
2. What methods do archeologists use to know where to locate a site?
3. How did the first residents of the Mesa Verde region earn a living? When did agriculture become established?

4. Why did the people move from the Mesa tops to the cliffs? (this is largely an opinion question.)
5. What crops were cultivated on Mesa Verde? How do scientists discover facts about plant and animal life?
6. What evidence exists of poor conditions for farms in the 1200's?
7. What does the evidence suggest is the primary reason the Anasazi abandoned Mesa Verde?
8. How did the Mesa Verde inhabitants obtain water? Why was such an elaborate system needed?

C. Study and Discussion Questions.
"Archeology for Layman and Scientist at Mesa Verde" Robert H. Lister. Science - Vol. 160, No. 3827 - May 3, 1968, pp.489.
1. What did the first Indians who occupied Mesa Verde do for a living? What was the basic culture of the people throughout the time in which Mesa Verde was occupied.
2. In what way have various sciences contributed to the archeological study on Mesa Verde? Give some specific examples.
3. What theories have been offered to explain the move from the Mesa top to the caves? to explain the abandonment of the area entirely? What is your opinion?

D. Study Questions.
"Anasazi; the Old Ones" American Indian Almanac - pp.18-20.
1. What way of life did the "Basketmakers" exhibit?
2. How had their life changed by the time the Pueblo culture reached its "golden age."

E. Discussion Questions: Slides -
The 18 slides selected include the following:
1-4. Views of the Mesa top and the surrounding countryside as seen from the Mesa top.
5. Far distant view of Cliff Palace.
6. View of small cliff structure.
7. Closer view of cliff palace.
8-9. Spruce Tree House.
10. Close up view of cliff palace.
11. Square Tower House.
12-16. Close up views of structure, etc.
17. Kiva.
18. Pit House.

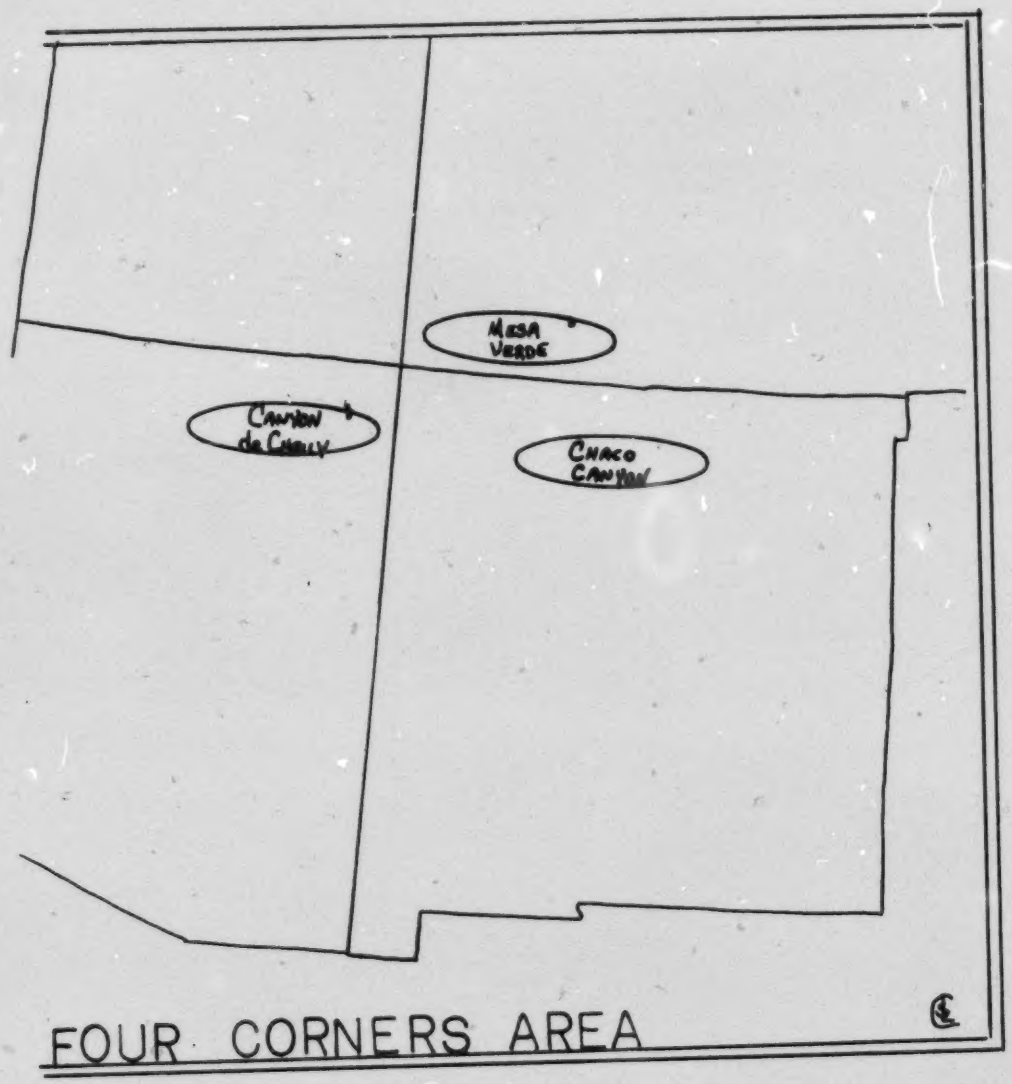
F. Discussion Questions: Slides
Questions:
Slides 1-4
1. How do you think life on the Mesa top might compare with life in the surrounding countryside?
2. What features of the Mesa environment are visible here? What type of climate do they indicate?
Slide 5
3. What do you see in this picture? Can you find the dwellings? (Note- this slide is especially good for showing the relationship of dwellings to Mesa top and the defense aspects of the area.)
4. What would be the advantages and disadvantages of a dwelling in this location?
5. Why do you suppose the dwelling was placed here?
Slides 6-9
As you view these slides one might discuss possible reasons for living in caves -- how one could construct such elaborate dwellings in caves -- how the people might have lived, etc.

Slides 10-16

6. How are these structures built?
7. What materials for building must have been available in this environment?
8. Based on these dwellings, what conclusions could you draw about the life of the people.

Slides 17-18

9. What is the first structure probably used for? the second structure?
10. What relationship can you see between the first and second structure? How might you account for this similarity?



INTERDEPENDENCE:
Food for the World Market

I. INTRODUCTION

Thomas Robert Malthus, an English economist warned eighteenth-century Europe that population was increasing so much more rapidly than the earth's ability to produce food that mankind would soon face misery, hardship and starvation. According to the Malthusian Theory, population multiplies according to geometric progression, that is 2,4,8,16,32; but the food supply increases according to arithmetical progression or 2,4,6,8,10. Malthus claimed that without artificial checks such as war, famine, and disease, the population would eventually exhaust its food supply.

However, the Industrial Revolution and the improved farming methods of the early nineteenth century seemed to prove Malthus wrong. Population has increased rapidly, but so has the world's food supply. People soon forgot Malthus or laughed at him. Today demographers - those who study population trends - as well as ecologists - those who study the relationship of plant and animal life to the physical environment - and economists and nutritionists are again concerned about the struggle for food. They know most of the people in today's world do not have an adequate diet and fear that this situation is growing worse.

The current food shortage is partly the result of disastrous '72-'73 crop season when floods in Pakistan, failing monsoons in India, the African drought, and other disasters sent nations on a food-buying scramble that reduced global grain reserves to the lowest level in 20 years.

As crops failed, demand grew and so did prices. For example, when the U.S.S.R.'s '72 wheat crop fell below usual levels, Soviet buyers purchased some 20 percent of U.S.grain stocks - a massive buy that cut sharply in world supplies and tripled the wheat prices.

The U.S. produces some 70 percent of the World's export grain, partly because it has nine percent of the globe's arable land and just six percent of its people. Canada and Australia produce most of the remaining grain exports. Hunger-belt nations tend to have more mouths to feed yet they have less arable land and must import food to keep up with the demand. Expanding the amount of arable land would be difficult. Irrigation is one possibility, though fresh water is in short supply throughout the world. Another aim is to increase productivity of land already cultivated. " Miracle grains" introduced in the '60's have helped. But high yield grains take their toll on the soil, and introduce the need for larger amounts of fertilizer. A major source of fertilizer is oil and the recent oil squeeze led to high prices and a worldwide fertilizer shortage that has already reduced grain production in India.

Perhaps the quickest way to provide more food is to change production and consumption patterns -- planting more soybeans and other high protein crops; making use of carp and other seafoods not generally consumed by humans; replacing tobacco and other cash crops with food crops, eating less meat and more grain.

At the World Food Conference in Rome, November, 1974, U.N. members searched for solutions to the food crisis. One aim - creating a World Food Bank, an international stockpile that could be drawn upon when famine strikes anywhere in the world.

In part the food story is one of " not enough to go around" and one of uneven distribution of food in a world where more developed nations are, if anything, overfed; and where others must struggle constantly to find enough calories to sustain basic life functions.

II. BEHAVIORAL OBJECTIVES

Following a successful encounter, students should be able to:

1. Know what limits the physical geography places on mankind - limits in land space on which to live, limits on planetary food resources.
2. Know what the "caloric gap" means to those nations whose populations overwhelm their food supply.
3. Know some way in which politics play a part in the food picture.
4. Know how weather plays an important part in crop production.

III. ACTIVITIES

1. Have students read Margin of Life, by Capa and J. Mayone Stycos, a book dealing with the effects of poverty and population growth in Latin America. Compare this with some of the reasons given for hunger in the introduction.
2. Have students jot down their reactions to Cornell Capa's photo of a Latin American mother and child - a photo which captures the human dimensions of the food and population story. A panel discussion can come from this.
3. Have students find recent editions of Time Magazine, Newsweek, and U.S.News and World Report and do the following:
   a. Cut out pictures which typify reasons and results of hunger.
   b. Use the above to create a bulletin board in the classroom.
4. Have students find the following information in encyclopedias or almanacs. Which is the world's largest nation in land areas? In population? Indicate this on a map of the World. Also the following can be indicated on maps by using different colored pins (etc.) to mean good - fair - poor and marking the following on them -
   Arable land (Food)
   Education (extent) -Average
   Industrial Development.
   Natural Resources (q.v.Oil)

IV. VALUES CLARIFICATION

A. Pattern Search:

1. Have students do research and find the answers to the following:
   a. Does this planet have a large amount of productive land?
   b. Is it important to conserve cropland?
   c. Is it a good idea to build cities away from cropland?
   d. How can we expand the amount of farmland?
   e. Can we make better use of the seas?
   f. What role does population play in the food picture?
   g. How does weather play a part in the Hunger Question?
   h. What part does geography play in shaping the World Food picture?
   i. Why do arable land regions sometimes follow river beds?

B. Letters to the Editor :

1. Write an editorial to the Observer or News (Charlotte, N.C.) concerning your findings in the activities above.

C. Letters to your Senators (U.S.) and Congressman:

1. Also write to your local, state and federal officials and report your findings.

D. Values Politics:

1. Find the relationship between Oil - Fertilizer - Politics - Spiraling Prices.

E. Values Contrast:

1. In most hunger belt nations the population size overwhelms the food resources. There are exceptions - Japan is one - Find several others. Why do you suppose they're exceptions?

F. Values Debates:

1. Read the Introduction and consider the following as the basis for several debates.
   a. The U.S. should feed the hungry people of the world.
   b. Tobacco and other cash-crops in U.S. should be replaced with food crops.
   c. Americans should eat more grain and share some of its meat with less developed Nations of the World.
   d. Those countries that cannot feed their own should be forced to practice some kind of birth control.
   e. The U.S.government gives so much to less developed nations; even though, we have serious hunger problems here.

Note: Students can think of other issues that have come to focus in this country recently about the lack of food in the world. Debates can come from these.

G. 1. Read the following poem keeping in mind what the author is saying. Discuss with class these implications in 1975.

Many people have looked on the United States as a land of unlimited resources. They have seen it as Whitman did - - -

"Behold America ! . . .
Behold, thy fields and farms, thy far off woods and mountains, ...
Thy limitless crops grass, wheat, sugar, oil, corn, rice, hemp, hops,
Thy barns all fill'd, the endless freight train and the bulging storehouse,
The grapes that ripen on thy vines, the apples in thy orchards,
The incalculable lumber, beef, pork, potatoes, thy coal, thy gold and silver,
The inexhaustible iron in thy mines." [1]

V. RESOURCES

Books:

Challenge and Change - U.S.History: The Second Century. Ebling, Johnson and Perrone, Laidlaw Brothers, 1973.

Ecology: Man's Relationship to His Environment, Lawrence J. Pauline, and Howard Weishaus, Oxford Books Company, Inc. 1971.

Ecology: The Study of Environment, H.E.Schlichting and M.S.Schlichting, Steck-Vaughn Co., 1971.

"Song of the Exposition," Leaves of Grass, New York: Random House,Inc.1930.

Magazines:

Famine

"Famines casts its grim global shadow," Time 103: 50-5 May 13,1974.

"Famine fears rise, battle lines form," Science News, 106:53-4,July 27,1974.

Food Supply

"Sahel: Tragedy of Underdevelopment," U.S.Kearney. America 131-67-9 August 24, 1974.

Population

"Misconceptions." P.R.Ehrlich and A.H.Ehrlich. N.Y.Times Magazine P.8-9+ June 16, 1974.

Games: (Can be found at Charlotte Nature Museum)

Ecology - Urban Systems

Population - Urban Systems

Man In His Environment - Coca Cola

(Rescue In Space and Make Your Own World)

Program Kits: (Can be found at Charlotte Nature Museum)

This Earth: A World of Differences

This Earth: Everything Fits Together

This Earth: How Life Adapts

[1] From "Song of the Exposition," Leaves of Grass,(N.Y.:Random House, Inc.1930)

KIKUYU

DEVELOPMENT or PRESERVATION? (double encounter)

I. INTRODUCTION

One of the most serious movements on the world scene today is the drive of the many emerging nations of the "third" world to better the living standards of their people. Improvements of living standards require development and utilization of land and resources, yet this very development can put these nations on the same path as the heavily industrialized nations - - a path which is highly destructive of the natural environment. Thus, we have a major dilemma facing these new, young nations. They need to pursue economic growth and development, they have a unique natural heritage to preserve.

This encounter focuses on the situation of the nation of Kenya which has been selected as an example of a newly independent developing nation. The situation here is similar to that in many other nations, though Kenya has perhaps a unique heritage of wildlife. Kikuyu tribe has also been focused upon as they constitute the most numerous tribal group in Kenya and they have played a unique role in the history of this country. Mention will also be made of the Masai, whose territory extends into Kenya also, and who have had an impact on the country's national park system.

The following discussion should provide necessary background information and should point out some of the many conflicts which occur in the struggle for development. How can Kenya create for its people a better life? Can they avoid overcrowded urban areas and industrial blight? Can the land be farmed efficiently with an eye to good conservation practices? Can the vast heritage of wildlife be exploited for tourism yet still preserved for future generations? Can man realistically "manage" the ecology of park areas without creating serious ecological imbalances? How do the national parks and reserves fit into the total picture of economic development?

The consideration of these questions should enable the student to encounter many of the environmental concerns which face many of the world's developing nations. Such a study should provide the student with a case study in modern world history, as well as environmental concerns in these nations. The study of animal overpopulation in the national parks should reveal to the students the far-reaching impact of governmental policy, or the lack of it, on the ecological balance of an area. The total problem of how preserving wildlife fits into the overall picture of development is a third important aspect of this encounter.

Actually, the material tends to lend itself to two encounters, one dealing with the attempt to raise the living standards of the people, and the others, dealing with the problems of preservation in the national parks. Of course, there are many areas of overlap. Thus it has been decided to provide a single introduction and activities which may be used for two encounters. In each case the many questions which actually face leaders in nations such as Kenya will be focused upon so as to point out that the choices involved clearly involve the values of the people. The students should, not only be able to identify these value conflict situations, but should be helped to clarify their own values through focusing on these problems.

Before proceding to consider activities, etc., let us look first at the history and geography of Kenya itself.

Kenya is located in East Africa and is a former British Colony. Kenya gained independence in 1963, following a period of bloody insurrection in the mid-fifties - - the Mau-Mau uprising. Most of those who participated in this rebellion were members of the Kikuyu. The conflict centered upon control of prime agricultural land -- which is particularly important to the Kikuyu tribe. They consider the earth to be the mother of the tribe and the most sacred thing in all of creation. In the traditions of the tribe, the land belongs to the entire group, but every kikuyu is entitled to some of this land to use for earning a living. As long as the land is used, it belongs to the person who uses it and can be passed on to their children. Whenever anyone does not use the land, all rights to it are ended and someone else can claim it. Kikuyuland can never be sold (though the right to work it may be transferred) because it belongs to the entire tribe.[1]

Shortly after the turn of the century, the British completed construction of a railroad from Mombasa to Lake Victoria. They found Kenya's fertile highlands sparsely settled, thus starting an influx of Europeans into the area. However, this area was part of Kikuyuland (see maps) It had been temporarily vacated by the African population following several years of famine, drought disease and a vast invasion of locusts. The tribe still owned the land, however, and soon they were ready to return to it. They found the land was taken over by white settlers. The Kikuyu were moved away to reserves and given land there.[2]

Some Europeans actually bought land from Kikuyu chiefs. The Kikuyu however thought they were only selling the rights to use the land and when they saw some of it lying unused they attempted to move into it. The result of this misunderstanding was great bitterness between the Kikuyu and the Europeans. This very valuable land became known as the "white highlands" because the British enacted laws prohibiting any African or Asian from renting, buying, or owning it.[3]

The bitterness over British land policy finally erupted in the Mau-Mau uprising (1952-56). Bloody terrorist attacks upon European farmers were the most publicized aspects of the revolt; however, the figures below indicate that the greatest toll was among Africans. Many tribesmen could not stand the death-oath of secrecy that members were forced to swear. It placed them in a "kill or be killed" situation.[4]

Africans did most of the fighting and dying in resistance to Mau Mau. When the revolt ended those officially counted as dead included:

1,232 -- African Civilians killed by terrorists.
524 -- African security forces killed by terrorists.
32 -- European civilians killed by terrorists.
63 -- European security forces killed by terrorists.
29 -- Asians killed by terrorists.
11,500 -- Mau-Mau killed.[5]

Many Europeans left Kenya during the Mau-Mau emergency and many Kikuyu there took over these unoccuppied lands.

In 1900 the British government began the purchase of 1,000,000 acres of European land for resale to Africans on liberal terms. This program, and others like it, were completed under the Kenya government following independence. A total of about 1-1/2 million acres have been transferred. The Kenya government, with financial help from international sources, is still purchasing land from non-citizens and reselling it to the Africans.[6]

As social change has come to Kenya many young people have flocked to the cities in search of jobs and excitement. The already overcrowded cities are growing at a rate of 6% per year.[7] Kenya faces many urban problems as shanty towns have sprung up in the cities.[8]

The government's policy is to encourage settlement of the land and full agricultural development. The following quotation from a speech by Prime Minister Jomo Kenyatta reveals this emphasis:

> "Our greatest asset in Kenya is our land. This is the heritage we received from our forefathers. In land lies our salvation and survival. It was in this knowledge that we found for the freedom of our country. Our plans for the future must spring from a resolve to put to maximum production our land, however small the acreage we may possess."[9]

Kenya has been particularly blessed in the great variety of wildlife found in the country. Elephants, rhinoceroses, lions, zebras, giraffes, etc., can be found in various areas of the country.

At present the government of Kenya supports 23 parks and reserves. They also have adjacent to these, "shooting blocks" where licensed hunting is allowed. Government plans call for 12-5% of the land area of the country to be included in parks.[10]

The conservation of wildlife is not without its problems, however. Kenya is not just preserving for the sake of preservation alone, rather the government views its wild life as one of the nation's major assets. In 1971 alone, Kenya had 4,000,000 foreign visitors, most of whom come to see wildlife. The rate is increasing at about 20% annually. Tourism is currently providing $ 55 million of foreign exchange which makes it the nation's most efficient industry in that respect.[11] Tourism can bring difficulties in terms of the ecology of an area. For example, sometimes there are as many tourists as antelopes in Nairobi Park on a Sunday afternoon and attempts to lure animals to tourist areas can result in overuse and damage to a habitat, as has happened near Treetops in the Aberdare Park. In addition, only a small percentage of the income generated by tourism finds its way back into conservation programs.[12]

Population pressures are beginning to have an impact on wildlife preservation programs also, of a growing population, demanding a higher standard of living begins to encroach upon lands near the park areas. These hinterlands have long been vital to the parks as the park territory itself is seldom large enough to provide for the park's eco-system. Unless some sort of comprehensive planning is undertaken, the problem will loom into crisis proportions.[13]

Kenya must not only balance preservation with the economic benefits of tourism, they must convince the native population of the benefits of permitting wild animals to live. To the native living in the bush, these animals are a threat -- either to their crops, their lives, or both. On top of that many of Kenya's tribes (the Masai, for example) have the hunting and killing of animals as part of their tradition. It is hard for these natives to understand why a tourist can pay a fee and shoot a lion when they would be jailed for killing for food or protection. So the government trys to educate the people to think of wildlife as a money-earning national asset.[14]

Within the parks themselves there is yet another problem. What to do about animal population explosions? Such a problem has occured in Kenya's Tsavo National Park. The elephant population boom there is threatening to completely alter the nature of the environment.

The problem arose when waterholes were created to preserve the animal lives during a period of extreme drought. These waterholes were not, however, closed when the drought ended. Therefore, elephants remained in the area rather than migrating. The vegetation of the area had no chance to recover from over-grazing. These waterholes became surrounded by waste lands. Once the "bush" was gone, grass began to develop. The result is that elephants are dying out while other "grass-land" type

species are invading the area. Some argue that nature should be allowed to follow its natural course and the area should continue to undergo this change. Others say that since man created the imbalance he should restore it through selective killing of elephants. They argue that elephants are in danger of becoming extinct in the very area created to preserve them.[15]

In studying the basic issues outlined here, several approaches could be profitably used. The activities suggested below concentrate upon problem solving approaches along with values clarification strategies. The values approach can be used to help the student project their own values into this situation, as well as, to understand the conflict in values which these issues represent in Kenyan society.

A bibliography of useful resources has been included. Many of these are referred to in the activities. Also included are some maps which should aid in the basic understanding of Kenyan geography.

FOOTNOTES

1 "The Foundations of Kikuyu Society" Project Africa, Carnegie-Mellon University (ERIC) p.24
2 Ibid., p.25
3 Ibid., p.25
4 Colonial Kenya, AEP Public Issues Series/Harvard Social Studies Project, pp. 50-52
5 Fisher Allan, "Kenya Says Harambie", National Geographic, Vol.135, No.2 Feb.,1969, p.167.
6 Ibid., p.168
7 Ibid. p.177
8 Op.Cit., "Foundations of Kiuyu Society" p.25
9 "The Kikuyu and Kenya Today," Project Africa, Carnegie-Mellon University (ERIC) p.20
10 Op. Cit., Fisher, pp. 161-162.
11 Myers, Norman, "National Parks in Savannah Africa",Science, Vol. 178, No. 4067, Dec. 22, 1972, p.1259
12 Ibid. p.1260
13 Ibid., p.1256
14 Op.Cit., Fisher. p.162.
15 Frame and Goddard, "Africa's Newest Dilemma; Too Many Elephants". Science Digest, Vol.71, March, 1972, pp.33-38.

II.A BEHAVIORAL OBJECTIVES

At the conclusion of a successful encounter the student should be able to:

1. Draw upon basic geographical data to formulate a hypothesis about the best course for Kenya to follow in seeking a higher living standard for her people.
2. Test their hypothesis against the actual policy of Kenya's government and compare the two in writing.
3. Demonstrate through a written test, a basic knowledge of the factural history of Kenya including the colonial period, the Mau-Mau rebellion, etc.
4. Demonstrate through class discussions and written exercises an understanding of the values of the Kenyans (particularly the Kikuyu) in regard to their land.
5. Reveal through contributions to class discussions knowledge of the fact that nations do have alternatives available in planning for future development and that these alternatives can affect the quality of their nation's environment.
6. Recognize and publicly affirm at least one value which they themselves hold regarding future development goals for their own country.

III.A ACTIVITIES

These activities are planned to follow in sequential order -- some may be omitted, but ideally, all should be completed for a successful encounter.

1. Provide the students with a set of maps of Kenya showing rainfall, elevation, major crops, etc.,(see Appendix) and with geography books, almanacs, atlases, etc., from which they can gather basic data on the geography and resources of Kenya. Also give students some blank maps to work with. Have students answer the following questions:
   (1) How many different regions would you divide Kenya into based on the data from the maps? Draw and label these regions on your own map. Compare your map with those found in atlases and geography books. Wat are the similarities? Differences?
   (2) Where do most of the people live?
   (3) Where do the Kikuyu live? (Note: they are the most numerous group in Kenya.) Where do the Masai live? List the main characteristics of these areas.
   (4) Compare Eldoret, Nadrobi, Mombasa, and Nanyuki, as to: elevation, average annual rainfall, average annual temperature, and population density. Try to fit these places into your regional scheme.
   (5) What are Kenya's major natural resources? What are each of these useful for?
   (6) Based on your answers to the preceding questions -- come to some conclusion or hypothesis regarding how most people in Kenya might earn a living. How the Kikuyu might earn a living? The Masai? List some advantages and disadvantages of these methods of earning a living, taking into account the geography of the areas we are talking about.
   (7) Pretend you are the head of the government of Kenya. Based on the data you have, formulate a plan for the future economic development of your country.

Note: These questions can be an individual assignment, or they could be used for small group work.

2. Have a class discussion following the completion of Activity # 1. Lead the students toward consideration of various alternative forms of economic development. Have them consider the potential impact of each alternative course on the natural environment of the country.
3. Have students do readings about the developmental policies of the government of Kenya. They should then compare their hypotheses developed in Activity # 1 with this policy and discuss the similarities and differences. Then they can discuss the prospects which the policy indicates in terms of the future quality of Kenya's environment.

   Suggested Readings:
   (1) "The Kikuyu and Kenya Today" Project Africa, Carnegie-Mellon University (ERIC)
   (2) Africa: Emerging Nations Below the Sahara, AEP Unit Books, pp.27-34.
   (3) Fisher, Allan, "Kenya Says Harambee" National Geographic, Vol.135 No. 2, Feb., 1969, p.167.
4. Have the students read about the colonial history of Kenya and the Mau Mau rebellion. Discuss the values of the Kikuyu tribe toward their land and how this affected the history of the country.
   Colonial Kenya. AEP Public Issues Series/ Harvard Social Studies Project.
   (The case studies and suggested activities contained herein are very valuable as discussion tools).
5. Read about the energy crisis and its affect on potential U.S. economic growth and the quality of our life. Write an essay comparing our situation to that of a developing nation such as Kenya.

IV. A VALUES CLARIFICATION STRATEGIES

Values clarification strategies can be effectively used at the beginning and conclusion of this encounter. They also might be most effectively used during various phases of class discussion. The classroom teacher can best determine when their use would be most effective in his classroom.

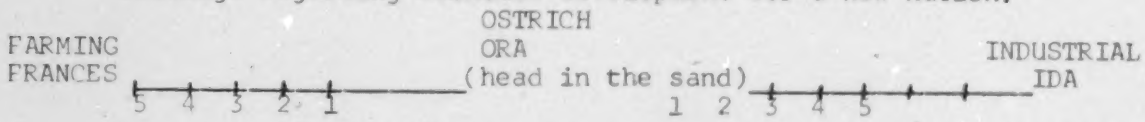
1. Alternative Action Search
   The students are given vignettes which describe a situation and asked, "Ideally, given your beliefs and values in regard to this situation, what should you do?" The student is to briefly write out his response. Then small groups of 3 or 4 are formed to discuss their proposals and try to decide on the most desirable solution.
   (a) You are an agricultural official in Kenya. Nazai tribesmen in your area are over grazing the land. Their cattle are becoming underfed, yet they continue to roam, taking over more and more land. Cattle are wealth and the people do not sell or slaughter them. You must improve the situation. Ideally, what would you do?
   (b) Kikuyu farmers near Nairobi have organized to demand that the government turn over additional land to them. The population is booming and no more land is available for sale in this area. The best free land has been designated a wildlife refuge. You are a government official who has to present a plan for solution of the problem. Ideally, what would you do?
   You should be able to find additional such situations to use from the actual reading matter of the unit.
2. As a follow-up to # 1 do a Consequences Search.
   Either individually or in small groups have students draw a

Consequences grid (see illustrations below) listing in the appropriate spaces the three best solutions they came up with for the problems in the Alternative Action Search. They should then list as many consequences of each alternative as they can possibly think of. After doing this they may wish to re-evaluate their alternatives.

CONSEQUENCES GRID

ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3

3. Values Continuum
Student should place themselves along this line according to their feelings regarding economic development for a new nation.



Farming Frances feels that agricultural development is the best for young nations. Industrial Ida feels that only through industrial development can a people enjoy a sufficiently high standard of living. Ostrich Ora sticks her head in the sand, refusing to take a stand on the issue. No student should be an Ostrich Ora.

4.Rank Order
Which of the following items would you prefer to spend money on in a developing nation:

____a new university
____an experimental farm
____an automobile factory

____importing grain and other food
____importing farm machinery
____building hospitals and schools

____A hydroelectric power plant
____an irrigation project for semi-arid lands
____a fertilizer factory

____buying land to resell to people who have none.
____buying land for a wildlife refuge
____buying equipment to start basic industries

(groupings may be rearranged to further clarify choices)

Which of the following items would you prefer to spend money on in an industrial nation like the U.S.

____exploring for new sources of fossil fuels
____development of nuclear power plants
____advertising to "educate" people to save electricity

____more national parks
____more wilderness areas
____new oil producing lands

____pollution control devices for industry
____education for conservation
____birth control programs

II-B BEHAVIORAL OBJECTIVES

At the conclusion of a successful encounter the student should be able to:

1. Demonstrate in writing and through oral expression an understanding of the major problems which exist in the National Parks and Reserves of Kenya and the policy of the Kenyan government toward their wild animal resources.
2. Recognize and publicly affirm their own values in regard to the preservation of wildlife.
3. Formulate their own ideas into a hypothetical plan for Kenya's wildlife which will take into account the needs of the animals and the people of Kenya.

III-B ACTIVITIES

These, activities, again are intended for sequential use. Some may be ommitted, but the encounter would be more effective if they were used in order.

1. Provide students with readings, pictures, etc. regarding Kenya's wildlife resources and their value to the country, especially as a tourist attraction. Have them write essays in which they outline the major problems Kenya faces in determining its wildlife policies. This can be done either as homework assignement or a class research project. (See Bibliography at the end for suggested resources.)
2. Follow-up Activity # 1 with an oral discussion of the problem. Hypothesize as to the possible solutions. Try to lead students to see that there are real value conflicts involved here. The class might like to "role-play" and formulate a policy for the Kenyan government.
3. As a concluding activity have students read about a similar "wildlife" issue in the U.S. What is our government's policy, etc.? Compare and contrast the two situations through role playing, and class discussion.

Suggested Sources:

Farb, Peter, The Land and Wildlife of North America. Life Nature Library, Time-Life Books, New York.

Grosvener, G. M. "America's Wilderness: How Much Can We Save?" National Geographic, Vol.145,Feb.1974, pp.151-157.

"Endangered Species: Symposium" National Wildlife, Vol. 12, April, 1974, pp.4-62.

East, Ben, "Who Are His Real Friends? Battle Over the Timber Wolf" Outdoor Life, Vol.152; Sept.1973, pp. 108-109.

IV-B VALUES CLARIFICATION STRATEGIES

1. Alternative Action Search and Consequences Search.

The students are given vignettes which describe a situation and asked, what would you do? The student is to briefly write out his response. Then small groups of 3 or 4 are formed to discuss their proposals and try to decide on the most desirable solution. In the case of this particular unit, the entire thing almost is an alternative action search. It might be useful to introduce this encounter with this strategy. Certain passages from the readings could be selected -- omitting those which offer suggested solutions. Students could then provide their own alternatives. These could then be used in a consequences search using the following procedure:

List the three best alternatives on the following grid:

CONSEQUENCES GRID

ALTERNATIVE # 1	ALTERNATIVE # 2	ALTERNATIVE # 3

Then for each alternative list as many possible consequences as you can. Students may then wish to re-evaluate their alternatives chosen in the light of these possible consequences. This strategy could be a good lead in for activities 1 and 2. In all probability the solutions offered by the students before they complete research and reading would be different from the solutions they come up with in Activity # 2.

3. Values Voting:
   Read aloud the following questions. Ask those students who wish to answer yes to raise their hands, those who wish to answer no to point thumbs down, and those who are undecided to hold their arms--those who want to pass should take no action at all. There should be no discussion until all questions are finished.

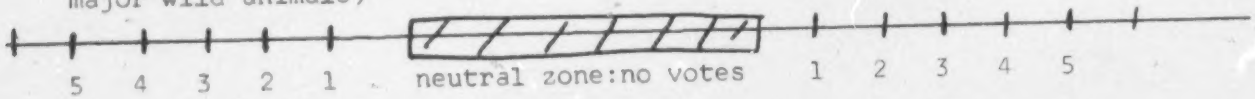
   How many of you --
   1. like to go hunting?
   2. have gone hunting recently?
   3. feel that sometimes killing wild animals might be justified?
   4. would never kill a wild animal under any circumstances?
   5. would vote to pay high taxes in order to set up a wilflife refuge?
   6. would go on a Safari to photograph wild animals?
   7. feel tourists who "take only pictures and leave only footprints" do no harm to wildlife.

4. Values Continuum:
   Students should place themselves along the following line according to their feelings:

SAFARI SAM (his fondest dream is to kill one of each of the world's major wild animals)

EXTINCT EZRA (he died out with dinosaurs)

ANIMAL LOVER ANDY (move out of his house rather than kill the rats)



5. Letters to the Editor:
   After reading about and discussing issues of silflife conservation in this country, students might like to publicly affirm their feelings on the issue by writing letters to the editor of the newspaper on the subject. If the issue is regional or national they might wish to write to an out-of-town paper or to a national publication.

V. RESOURCES

BOOKS AND PAMPHLETS

COLONIAL KENYA, AEP Public Issues Series/ Harvard Social Studies Project, American Education Publications, Middletown, Connecticut.

AFRICA: EMERGING NATIONS BELOW THE SAHARA, AEP Public Issues Series/ Harvard Social Studies Project, American Education Publications, Middletown, Connecticut.

ANIMALS OF EAST AFRICA, National Geographis Society, Washington, D.C.

LAND AND WILDLIFE OF NORTH AMERICA, Life Nature Library, Time-Life Books, New York

LAND AND WILDLIFE OF AFRICA, Life Nature Library, Time-Life Books, New York

Fisher, Simon, & Vincent, WILDLIFE IN DANGER, Viking Press, New York,1969.

Wallbank, T. Walter, CONTEMPORARY AFRICA, D. Van Nostrand Co., Inc., Princeton, N.J.

Burke, Fred, AFRICA, World Regional Studies, Houghton Mifflin, Boston.

Curtin, Philip D. AFRICA SOUTH OF SAHARA, Culture Area Studies, Silver Burdett, Morristown, N.J.

Foster,Philip J. AFRICA SOUTH OF THE SAHARA, Culture Regions of the World, The MacMillan Co., New York.

Clark, Leon E., ed. THROUGH AFRICAN EYES, Vol. V THE RISE OF NATIONALISM, Praeger Publishers, New York.

Kolevzon, Edward R. AFRICA SOUTH OF THE SAHARA, Allyn & Bacon, Inc., 1969.

PERIODICALS

East, Ben, "Who are His Real Friends? Battle Over the Timber Wolf" OUTDOOR LIFE, Vo. 152; Sept., 1973, pp.108-109.

Fisher, Allan, "Kenya Says: Harambee" NATIONAL GEOGRAPHIC, Feb. 1969, Vol. 135, No. 2, p.167.

Frame & Goddard, "Africa's Newest Dilemma: Too Many Elephants" SCIENCE DIGEST, vol. 71, March, 1972, pp.33-38/

Grosvenor, G. M., "America's Wilderness: How Much Can We Save" NATIONAL GEOGRAPHIC, Vo. 145, Feb., 1974, pp.151-157.

"Endangered Species Symposium" NATIONAL WILDLIFE, Vol.12, April, 1974, pp.4-62.

"Death of the Tsavo Elephants" SATURDAY REVIEW, Sept. 30, 1972,pp.28-36.

Myers, Norman, "National Parks in Savannah Africa", SCIENCE, Vol. 178, No. 4067, Dec. 22, 1972, p.1259.

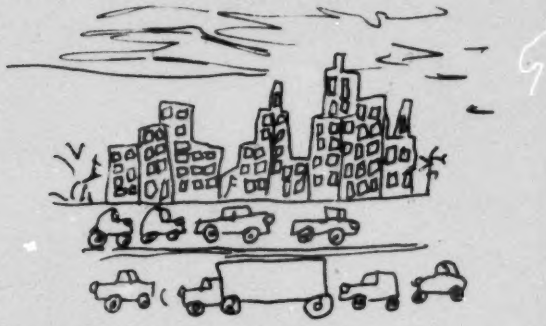
"People Crunch Comes to East Africa", NATURAL HISTORY, Vol. 82: 10+ Jan., 1973.

ENCYCLOPEDIAS

Sachs, Moshe Y., Editor, WORLDMARK ENCYCLOPEDIA OF NATIONS, Worldmark Press, Harper & Row, New York, Vol. 2, pp 121-130.

AFRICA SOUTH OF THE SAHARA: CULTURE STUDY IV, " The Kikuyu of Kenya" Project Africa Carnegie-Mellon University, 1969, (ERIC-EDO 54035)

POLLUTION
IMPACT ON YOU



I. INTRODUCTION

What is pollution? Pollution has been defined as "a resource out of place." The statement points out an interesting idea, that pollution is a resource which if harvested could become valuable.

In an examination of pollution, two vital resources deserve great concern. The first's water, the universal solvent, the most abundant substance on the surface of the earth which covers three-fourths of that surface, giver of life, and cleanser of the biosphere is in trouble. It is most interesting to note that the trouble-maker is man. Not only has man contaminated the water, but he is increasingly contaminating the air, the second resource. From the time that man first controlled fire, air pollution has been a problem. As time progressed, increasing population and increasing urbanization has aggrevated the problem causing more concentrated air pollution, more and worse in versions, and more deaths attributable to the pollution.

When one closely examines these existing conditions, it will be clear that now is the most opportune time to seek solutions for these vital problems.

II. BEHAVIORAL OBJECTIVES

At the end of a successful encounter, the student should be able to:

1. Cite 5 (or more) examples of waste in the air, in the water, and on land.
2. Be able to discuss how pollution is really a waste of our resources.
3. Demonstrate a knowledge of problem - solving by solving environmental problems.

III. ACTIVITIES

1. Examine the grounds at your school or in your community. Note examples of litter, water pollution, air pollution, noise pollution, etc. List these examples.
2. Divide students into groups. Each is responsible for presenting and posting visual material as evidence that pollution does exist.
3. (Casework). Each student is required to choose a person in the community, and find out what he considers to be the most serious environmental problem. The assignment will be for each student to work out a solution to the problem.
4. Have a discussion on "what makes something a problem?"
5. Writing assignment: Write two well-organized paragraphs. One developed by the cause-effect method and the other the argumentative paragraph. Topic: Pollution.
6. Class Project: Make some place in the room more natural. On the assigned reporting day each student will be required to add to the naturalizing of the room at the conclusion of his report.
7. Writing Assignment: Describe the changed area in the classroom in a well-organized paragraph by means of the descriptive method.(See # 6)

IV. VALUES CLARIFICATION

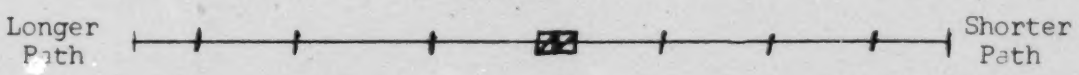
A. Values Voting:

1. How many feel that you should pick up litter although you did not drop it?

2. Do you feel that it is your responsibility to call to the attention of one who drops litter?

B. Continuum:

You can walk to a park two ways. The longer path takes you by a pond with ducks swimming in it. The shorter path takes you through an ugly part of the city littered with trash. Which way would you go? Why?



C. Discuss or Debate:

Give two reasons and examples as to why you feel this way.

1. Does the environment make people the way they are?

OR

2. Do people make the environment the way it is?

V. RESOURCES

Books:

Environment and Man, Richard H. Wagner, W. W. Norton and Company, New York, 1971.

An Introduction to Pollution, Harold E. Schlichting, Jr. and Mary Southworth Schlichting, Steck-Vaughn Company, Austin, Texas, 1972 (Teacher level.)

Books and Pamphlets:

Water Pollution, Charles W. Lavaron, Patrick A. O'Donnell, Lawrence A. Lindberg, Addison-Wesley Publishing Company, Reading, Maine, 1971.

Films:

"Clean Water is Everybody's Business," NMA, 35 mm. color.

"Problem with Water is People," MHT, 16 mm., 30 min., color.

Filmstrips and Records:

"Waste -- A New Pollutant," Society for Visual Education.

"Water -- Pollution -- A Complex Problem," Society for Visual Education.

Kits:

"Can I Drink the Water?" Kit 6, Urban System, Inc., 1033 Massachusetts Avenue, Cambridge, Massachusetts, 1971.

"Can I Breathe The Air?" Kit 6, Urban System, Inc., 1033 Massachusetts Avenue, Cambridge, Massachusetts, 1971.

Game:

"The Air Pollution Game," Urban Systems, Inc.

"The Clean Water -- The Water Pollution Game," Urban Systems, Inc.

PRIMITIVE CULTURES:

A Return to the Good Life?

I. INTRODUCTION

Cultures are affected by, and to some degree, shaped by, the environment in which they develop. The Phoenicians became adventuring sea farers when the limited resources of their lands led them to sea. Southern Europeans are more demonstrative, "warmer," if you will, than northern Europeans. But in primitive cultures, the relationship between environment and culture is more readily apparent. For example, it is easy to pick out elements of Eskimo culture which have been developed specifically to cope with the harsh life of the Arctic.

A study of primitive cultures, enables a person to better understand the interdependence of a man and the environment and, at the same time better appreciate that modern, industrialized man cannot ignore his dependence upon the natural world.

It has been said by Meggers in Environments of Man that "the level to which a culture can develop is dependent upon the agricultural potentiality of the environment it occupies. In other words, men who live in areas where they must depend upon limited resources for hunting and gathering will develop only crude technology and simple social structures based on kinship and family ties. Even the natural inventiveness of the people and the borrowing of ideas from other cultures are not generally sufficient to overcome this barrier. Conversely, it has been noted that all of the great ancient cultures of the world developed in areas of realively unlimited agricultural potential.

This encounter provides an opportunity for students to examine primitive cultures in relationship to the environment, and investigate their understanding of how environments affect the value systems of the people who inhabit them. The relatively abundant resources of the United States' northwest coast, for example, led to the adoption of the potlatch as a ceremony among the Indians of that area. American values have been shaped by the abundance of our nation's natural resources.

II. BEHAVIORAL OBJECTIVES

At the conclusion of this encounter, the students should be able to:

1. Demonstrate in writing a basic factual knowledge of at least one primitive culture and explain the major relationships which exist between the culture and the environment.
2. List at least five different customs, tools, etc., from at least five different cultures which bear a direct relationship to the culture's environment.
3. Explain orally or in written form the impact of the environment on the values system (or belief system) of the people they have learned in No. 1. (For example: witchcraft, folklore, etc.)
4. Recognize and publicly affirm at least one value which they themselves hold which has been determined largely by their geographical environment.
5. Be able to locate on a map the geographic location of at least one group of people from each of the following types of governmental organization and list at least two environmental factors which helped to determine that form of organization:
   a. bands
   b. tribes
   c. chiefdom
   d. primitive state (Scheme divised by Elman Service, University of Michigan, Ann Arbor, Michigan.)

III. ACTIVITIES

1. Play "Word Baseball" with vocabulary terms selected from materials on cultural anthropology. These terms should acquaint students with the basic language used to discuss people and their environment. A suggested list follows, but others may be added:

Band	Pastoral	Milpas
Hunters	Agriculture	Money
Gatherers	Domestication	Barter
Tribe	Primitive state	Subsistence
Chiefdom	Nomad	Marketing
Property	Transhumance	Technology

Anthropology texts as well as dictionaries may be used to secure definitions. In playing the game words are given 1, 2, 3, or 4 "base" values and students are divided into teams. A student selects the value level of the word he defines -- a correct answer gives him the correct number of bases while an incorrect answer means an "out" for his team. Three outs per side per inning -- just as in regular baseball.

2. Independent Study: Collect a number of resources in the room or library. Have each student select one culture for reading and study. At the end of this study, each student will report orally to either the entire class or to a small group of other students about his culture. Students will be responsible for learning at least five different environmentally-based customs, etc., from reports of other students.
3. As a variation on activity No. 2. The entire class might read about one culture, provided adequate materials exist. Following discussion of environmental factors in this culture, students might then do independent research to locate and report on other such factors and customs.
4. Prepare a classification chart of the various cultures which have been studied and reported on -- classify them as to type of government, type of economy, geographic location, and the major environmental factors of that location. See sample below:

People	Government	Economy	Location	Environment
Bushmen	Bands	Hunting/ gathering	S.W. Africa	Desert
Yanomamo	Tribe	Slash & burn agriculture & hunting	South America	Jungle
Eskimo	Bands	Hunting/fishing	Arctic	Ice, snow tundra, sea

Note the patterns that emerge and discuss the environmental factors that determine these.

5. Follow-up the chart exercise with a map exercise. Put a physical map of the world up on a bulletin board and use different colored pins to locate all the people who live in bands, tribes, etc. This may also be done with economic systems. The purpose of this exercise is to reinforce visually what students learned from the chart.
6. Have students construct a visual display of items used by primitive peoples. For example, they might make stone tools, bows and arrows, woven baskets, etc., and explain how these were used. Books on American Indians crafts would be useful here. Stress how environmental conditions determine the materials available for use.

7. Show films, slides, filmstrips, etc., which illustrate primitive cultures. Have students make a list of environmental conditions as they view these for future use in discussion.
8. Have students read and then dramatize myths and folk tales and then have them list the environmental conditions reflected herein.
9. Using the cultures which the students have already reported on and discussed. Have small groups prepare demonstrations, skits, or role-playing situations which show how beliefs and values reflect environmental factors. For example, one group might stage a rain-dance, another might dramatize a witchcraft ceremony. The resources used in studying the cultures should also include discussion of the beliefs of the people involved.

IV. VALUES CLARIFICATION

A. Rank Order

1. Show students pictures of three different environments:
   a. A desert
   b. A tropical jungle
   c. A modern city

   Where would you most like to live?
2. Assume you can no longer live where you now do.
   Where would you most like to live?
   a. A suburb of Los Angeles, California.
   b. A remote village in northern Alaska.
   c. A lush, tropical island in the South Pacific.

B. Values Voting

1. How many of you would choose backpacking in a remote wilderness for a vacation trip?
2. How many have ever done this?
3. How many of you would like to live on a small farm where you grow all of your own food?

C. Open-Ended Statements

1. One skill I want to develop is _____.
2. If I could live anywhere in the world I would choose _____.
3. When the weather is hot and dry, I _____.
4. My decisions are most influenced by _____.

D. Baker's Dozen

List 13 things you used yesterday. Then:
1. Cross out the three you think you could without most easily.
2. Select the three you like the best.
3. Select the three you think you NEED the most.
4. Select those you would need or could use if you went backpacking in the Grand Canyon.

E. Role-Playing

Pretend you are each of the following people and answer the questions below:
1. A young eskimo living near the Arctic Circle.
2. A goat-herder in the Himalayas.
3. A bushman hunter in the Kalahari desert.
   a. One skill I would like to learn is _____.
   b. My decisions are most influenced by _____.
   c. My favorite material possession is _____.
   d. What would make me happiest is _____.

F. Values -Clarifying Discussion

Conduct a discussion about the pro's and con's of introducing modern technology to a primitive people. Help students clarify their own values regarding things they would want to introduce or not want to introduce and why.

As a culminating activity, students might choose to discuss as a class or in small groups, the values they expressed in other exercises and the way in which these reveal the influence of their own environment.

V. RESOURCES

The success of this encounter depends upon the choice of a good variety of primitive cultures for study which will adequately reflect the influence of environment on their customs, etc. There are numerous cultures which do a good job here and every teacher will want to make their own selections. The following list is intended only to offer suggestions of different cultures which might be included as good examples of various things. This is by no means an exhaustive list.

People	Location	Characteristics
Bushmen	Kalahari desert S.W.Africa	Hunters,gatherers; Band organization
Eskimo	Arctic	Hunters; Bands; Tailored clothing
Anazazi	Mesa Verde, Colorado	Farmers; traders; Cliff dwellings; Use of environment for defense
Yanomamo	South America	Shifting agriculture; Tropical jungle, etc.
Masai	Africa	Pastoral culture
Aztecs, Incas, Mayas	Central and South America	Advanced early cultures; Agriculture; Cities,trade, etc.

General Works on Cultural Anthropology, (Many give examples drawn from specific cultures).

Beattie,John, Other Cultures, The Free Press, MacMillan Publishing Company, Riverside, New Jersey.

Brown, Ida, Understanding Other Cultures, Prentice-Hall, Inc., Englewood Cliffs, New Jersey.

Cover, Lois, Anthropology for Our Times, Oxford Book Company, New York.

Emker and Emker, Cultural Anthropology, Appleton-Century-Crofts,New York.

Margaret Mead, People and Places, Bantam Books, New York. (Especially good for junior high level.)

Works on Specific Cultures or Groups of Cultures:

Service, Elman, Profiles in Ethnology, Harper and Row, New York.

Spindler, George and Louise, editors, Case Studies in Cultural Anthropology, Holt, Rinehart and Winston, Inc., New York. (This is an extensive series--the following titles might be useful as resources for this study. These are usable with senior high school students through some chapters may be a bit too technical.)

Beals, Gopalur: A South Indian Village.

Beattie, Bunyaro: An African Kingdom.

Chance, The Eskimo of North Alaska.

Hart and Pelling, The Tivi of North Australia.

Hoekel, The Cheyennes: Indians of the Great Plains.

Middleton, The Lugkara of Uganda.

Pospisil, The Kapukee Papuans of West New Guinea.

Chagnon, Yanomamo: The Fierce People.

Thomas, Elizabeth, The Harmless People (The Bushmen), Random House, Westminister, Maryland.

Litzitsky, Gene, Four Ways of Being Human, Viking Press, New York, (The semai, the Moori, the Eskimo, the Hopi).
Service, E. R. The Hunters, Prentice-Hall, Englewood Cliffs, New Jersey
Coon, Carleton, Caravan: The Story of the Middle East, Holt Rinehart and Winston, New York, (excellent on pastoralists).
Watson, Indians of the Mesa Verde, Mesa Verde Museum, Mesa Verde, National Park, Colorado.
(The following books are recommended for use with Junior High School Students:)
Baldwin, Gordon C., How Indians Really Lived, G. P. Putnam's Sons, New York.
Baity, Elizabeth, Americans Before Columbus, The Viking Press, New York.
Tunis, Edwin, Indians, The World Publishing Company, Cleveland.
Leavitt, Jerome, America and its Indians, The National Geographic Society, Washington, D. C.
American Heritage Junior Library, Indians of the Plains, Harper and Row, New York.
The following is a series of works on various cultures:
Bleeker, Sonia, The Apache Indians, William Morrow and Company, New York.
Bleeker, Sonia, The Aztecs, William Morrow and Company, New York.
Bleeker, Sonia, The Cherokees, William Morrow and Company, New York.
Bleeker, Sonia, The Chippewa Indians, William Morrow and Company, N.Y.
Bleeker, Sonia, The Crow Indians, William Morrow and Company, New York.
Bleeker, Sonia, The Delaware Indians, William Morrow and Company, New York.
Bleeker, Sonia, Horsemen of the Western Plateaus, William Morrow and Co., New York.
Bleeker, Sonia, Indians of the Long House, William Morrow and Company, New York.
Bleeker, Sonia, The Maya, William Morrow and Company, New York.
Bleeker, Sonia, The Navaho, William Morrow and Company, New York.
Bleeker, Sonia, The Pueblo Indians, William Morrow and Company, New York.
Bleeker, Sonia, The Seminole Indians, William Morrow and Company, New York.
Bleeker, Sonia, The Sioux Indians, William Morrow and Company, New York.
Bleeker, Sonia, The Mission Indians of California, William Morrow and Company, New York.
Bleeker, Sonia, The Masai: Herdus of East Africa, William Morrow and Company, New York.
Bleeker, Sonia, The Zulu of South Africa, William Morrow and Company, N.Y.
Bleeker, Sonia, The Iko of Biafra, William Morrow and Company, New York.
Kaula, Edna, The Bantu Africans, Franklin Watts, Inc, New York.
Donna, Natalie, Boy of the Masai, Dodd, Mead and Company, New York.
Schloat, G. Warren, Dull, A Boy of Liberia, Alfred A. Knopf, New York.
Schloat, Kwaku, A Boy of Ghana, Alfred A. Knopf, New York.
(Also useful are such series as the "Land and People of _____" books and "Let's Visit_____.")
Slide Presentation:
"The Indians of Mesa Verde," to be made available through the Environmental Center at the Charlotte Nature Museum.
Films:
"Nanook of the North," (available through the Charlotte-Mecklenburg Public Library), the original documentary of Eskimo life, 1925.
Available from Charlotte-Mecklenburg Schools:
"African Village Life in Mali--A Series," Int. Film Foundation.
"The Apache Indian," Coronet Films.
"The Aztecs," Coronet Films.
"Daily Life of the Bozo," Int. Film Foundation.

"Eskimo Children, " Enc. Britannica, (for younger students).
"Herding Cattle on the Niger," Int. Film Foundation.
"The Hop Indian," Coronet Films.
"The Mayas," Coronet Films.
"Navaho Indians," Encyclopedia Britannica.
"People of the Congo, The Mangbetu," Encyclopedia Britannica,
(for younger students).

PSYCHOLOGY:
Changing Man's Values

I. INTRODUCTION

In this complex and changing society, many of us are faced with numerous challenging problems. It appears that more and more, we are having to make difficult decisions. It is important to note that many of our decisions are made because of our living surroundings; our environment.

> "The earth is literally our mother, not only because we depend on her for nurture and shelter, but even more because the human species has been shaped by her in the womb of evolution. Each person is conditioned by the stimuli he receives from nature during his own existence. Our perception and interpretation of reality is conditioned by the size, shape, and color of landscapes, buildings, and rooms. Every human being lives in a conceptual environment of his own which conditions all his ethical and social attitudes, such as his opinions concerning the nature of progress, his view of man's place in the cosmic order of things."Rene Dubos, A God Within.

Have you ever given much thought to how your decisions would change if your environment were to change? Although many do have strong convictions in life, in most cases, we are " what we are," because of our existing environmental conditions. Because of this condition, it is wise for us to examine and to see just how much our environment affects us and our way of thinking and living.

Lord of the Flies is a novel about a group of boys who are brought to an island to escape from the atom bomb. It is important to note that these are young boys ranging from ages six to eleven. The first reaction of course is one of excitement. As they continue to stay on the island some of the thrill slowly start to drift away and they are "forced" to realize that there is a need for rules and regulations if they are to survive. Although they are wise enough to establish rules and regulations based on a democratic process, that natural surrounding, the environment makes it impossible for them to abide by these rules. It is an excellent novel for students to examine and analyze, for step by step the average student can clearly see the boys drift away from an innocent stage. In reality, they do become a product of their society.

II. BEHAVIORAL OBJECTIVES

At the end of a successful encounter, the child should be able to:

1. Discuss how an environment that includes the family institution, proper food preservation, sanitation laws and conservation laws helps to promote sound mental health.
2. Discuss how changes in the above factors (and others) cause people to break away from standards set by society.
3. Realize that "survival" will be the main objective as the environment changes.

III. ACTIVITIES

1. Have students discuss camping experiences they have had.
2. Role playing -- Have a student imagine that he is on a deserted island. His responsibility will be to show how he would survive.
3. Have a speaker come to class and talk about an experience or experiences in which he had to depend upon bare necessities in order to survive.
4. Have students act out several parts from the novel that they feel are against the behavior code of our society. Students must then explain why they feel these incidents came about.

5. Show filmstrip, "Environment -- Changing Man's Values."

IV. VALUES CLARIFICATION

A. Values : Decision -Making:

1. What do you think are the essentials of the "good life?" Make a list and rank in order of importance.
2. "Pack a Suitcase:" Setting: Deserted island
   a. Each student is to make a list of 20 items that he would pack.
   b. The students are then to divide into groups -- 4 or 5 per group. Each group must arrive at "only" 20 items which would be needed.
3. What kinds of living things would you kill without concern?
4. Mrs. X died because of a respiratory illness. Since you failed to have your faulty exhaust system repaired, are you a killer?
5. Imagine that all the water is polluted. To your surprise, you discover that your long, lasting friend who lives next door, has a small quantity of pure water. However, he refuses to share. What would you do?

V. RESOURCES

Books:

The Environmental Crisis: Man's Struggle to Live with Himself, Harold W. Helfrich, Jr., Yale University Press, New Haven and London, 1970.

The Ecological Citizen, Dirck Van Sickle, Harper and Row, New York, San Francisco, London, 1971.

Sane Living in a Mad-World, Robert Rodale, Rodale Press, Pennsylvania, 1972

Scout Craft Activities, National Council, Boy Scouts of American, New Brunswick, New Jersey.

Teaching for Survival, Mark Terry, Ballantine Books, Inc., New York, 19[illegible].

Filmstrip and Record:

"Environment" Changing Man's Values," Guidance Associates of Pleasantville New York, Part I, 1970.

Speakers:

Jesse Brown - Backpacking, 224 Independence Boulevard (334-5205)

Boy Scouts of America, Mr. Eugene Grimes, Public Relations and Program Director, 140 East 7th Street, 333-5471.

SCIENCE FICTION:
Fantasy Used in Problem-solving

I. INTRODUCTION

In this changing society, environmental problems that are arising will definitely have a great effect on the future of our world. If we "all" do not work together to combat the problem, note a few predictions or statements that could result.

"The human race . . . is in danger of strangling itself by over breeding, of poisoning itself with pollution, of undermining its essential human character by tampering with heredity and of preverting the whole basis of Society with too much prosperity . . . " [1]

"In the 1970s the world will undergo famines, hundreds of millions of people are going to starve to death in spite of any crash program embarked on now."[2]

Based on these statements, one can clearly see that there is a conflict--the clash of opposing forces. Note however, that in making a comparison of man controlling conflict in a story there is a great similarity. For just as an author can control conflict in three different ways: man vs man, man vs environment, and man vs himself, each person as a responsible citizen can and should attempt to control the environmental conflicts. For just as an author allows the reader to rejoice about that happy ending or to cry when tragedy is involved, it will be the citizens who will determine what the future holds. For the time being, let's assume that man has lost control of his environment.

II. BEHAVIORAL OBJECTIVES

At the completion of a successful encounter the student should:

1. Understand the effects of water, air and land pollution, over - population, waste of natural resources on man and his environment.
2. Have an awareness of environmental problems and a realization that there "must" be means of solving them.
3. Appreciate the environment enough to work toward the preservation of its natural resources.
4. Understand the procedures used in collecting and analyzing data related to environmental problems.
5. Realize their role in improving our over-populated, denatured, polluted environment.

III. ACTIVITIES

1. Make reports on contemporary readings dealing with the predictions for the future. Discuss these readings giving factual evidence agreeing or disagreeing with the conclusions reached.
2. View as many science fiction T.V. programs as possible and discuss the environmental problem that brought about the existing conflict.
3. Read science fiction short stories and discuss the problems involved or the problems faced by the protagonist.
4. Make a critical analysis of the short stories read with emphasis on the aspects of the environment involved in each element.
5. Discuss some environmental problems that seem to bring about the need for a new planet, and invent such a planet indicating the kind of life that would inhabit the planet and the types of intelligent beings and the society that might grow from such a life.

1. John Maddox, The Doomsday Syndrome (New York: McGraw-Hill Book Co.1972)p.3
2. Ibid., p.18.

6. Write a science fiction short story that stresses conflicts brought by environmental problems.

IV. VALUES CLARIFICATION

A. RDA:

1. List items that are considered necessities that are polluting the air.
2. Using this list, indicate the things that man can probably do without and the things that he can change to decrease the hazards caused by pollution.

B. Public Interview:

1. Plan and conduct a survey to find out the attitudes of the students concerning the environmental problems brought about by our changing society.
2. Conduct a survey to find out what students would do to minimize the hazards caused by pollution.

C. Contrived Incident:

Invite a group to the class to discuss controlling pollution and other environmental problems. Students with opposing views will be permitted to give their views on the problem discussed.

D. Pictures Without Captions:

Using pictures depicting pollution, over-population, etc., write captions for them and discuss the captions in groups.

V. RESOURCES

Films:

Environmental Pollution - Our World in Crisis.
Municipal Sewage Treatment Process, P.H.S.
The Third Pollution, Stuart Finley, Inc., Falls Church, Virginia.

Books:

Andrews, William A., Environmental Pollution, Prentice-Hall, 1972.
Elliott, Sarah M., Our Dirty Air, Messner, 1971.
Heinlein, Robert, Farmer in the Sky, Scribner, 1950.
Maddox, John, The Dooms Day Syndrome, New York: McGraw-Hill Book Co.1972.
Nourse, Alan E., The Universe Between, McKay, 1965.
St.John, Philip, Rocket Jockey, Junior Literary Guild & Winston, 1952.
Wagner, Richard, Environment and Man, W. W. Norton and Company, 1971.
Wentworth and Others, Pollution, Mine Publications, Inc., 1971.
Wright, Helen, Great Adventures in Science, Harper, 1956.

URBAN LIFE:
The Good and the Bad

I. INTRODUCTION

"The environmental crisis is an outward manifestation of a crisis of mind and spirit. These could be no greater misconception of its meaning than to believe it to be concerned only with endangered wildlife, man-made ugliness and pollution. These are part of it, but more importantly, the crisis is concerned with the kind of creature that man is and what we must become in order to survive."

- Lynton K. Caldwell

(An overhead transparency to illustrate this idea can be found in the Nature Museum)

Garrett Harden said nineteen-sixty was the time when the media united in agreeing that we had entered the space age. They were ironically right. By the end of the sixties, it was obvious that the space out there - out in a useless moon or in the interstellar space - are practically unavailable to us as far into the future as can be seen. The space that matters most to us now is inner space, the space inside our heads, the space in which we build our conceptions of the external world and of how humanity fits into it - the space of ecological insights.

Man is deeply affected by his surroundings. Polluted and overcrowded cities foster physical and mental illness. Studies on animals show that overcrowding leads to apathy, retardation and psychoses.

One reacts to what you touch, smell, hear and see. People are excited by movement, intrigued by variety, soothed by quiet, stimulated by color, and kept interested by change. Beauty is defined as giving people pleasant sensory and emotional experiences.

Noise is threatening the physical and mental health of America's urban environment. Home appliances, city noises, industrial noises, and even entertainment are constantly increasing as a threat. According to the EPA an estimated 16 million people in the United States already suffer from some degree of hearing loss which could result in industrial injury and have a resulting economic consequence.

Since these activities have proven highly intrinsic this indicates a need for looking ahead with understanding rather than greed.

II. BEHAVIORAL OBJECTIVES

After completing this encounter, the student should be able to

1. Gain insight into reasons for his personal choice and orally express them.
2. Demonstrate through the activities listed below an understanding of others feelings.

III. ACTIVITIES

The two booklets, Noise Pollution and An Introduction to the Urban Environment, include many activities that easily relate to the encounter. (These are listed in the resource section.)

1. Make several posters using the suggestions below:
   a. Posters are an attractive way of livening up a room (Where Love Rules)
   b. They can be used to express our appreciation of beauty in our environment. (Love Does Not Dominate.)
   c. Or to express our concern for the environment.
   d. Posters can make us more aware of environmental problems. (Those We Have Met.)

e. In addition, they can serve as a way of getting across an environmental message. (Take Good Care of the Earth.)
f. Posters can be an interesting way of getting across information and environmental facts to students.

2. Read "Whose Garden Was This?" (found in appendix)
3. Learn to use decibel meter. Survey several familiar environments and rate the sounds.
4. Show the two part slide program - Man and His Environment: In Harmony and In Conflict. (The second set maybe used alone if time is limited.)

IV. VALUES CLARIFICATION STRATEGIES

Using the sets of slides and the tape, the students individually or collectively will decide the following. The sets of choices listed are merely suggestions. In some cases there are blanks - the teacher should feel free to add additional material. A complete set of the slides will be housed at the Environmental Center at the Nature Museum. Past experience has shown that it is possible that this activity will reveal inner anxieties among some of the students.

A. Rank Order:

Set I - Show preference
1. Water lily
2. Cemetery of artificial flowers
3. Field of wild flowers
4. Expanse of concrete (maybe 1 tree)
5. Weedy, dirty lot.

Set II - Where would you prefer to be?
1. Isolated mountain
2. Crowd at school campus
3. Lone man at Linville Falls.

Set III - Which do you consider most attractive?
1. House at Riverhills
2. Formal house
3. Attractive high-rise apartment
4. Ice on trees in mountains
5. Drive-in with litter.

Set IV - Which do you find most peaceful?
1. Humming bird in nest
2. Dead tree
3. Mountain
4. Valley fog
5. Motorcycle riders.

Set V - Which makes you feel freer?
1. Men with fishing nets
2. Crowd dancing
3. Birds in flight
4. Linville Falls
5. Marshall Park.

Set VI - Which do you find most frightening ?
1. Freeway
2. Down town
3. Police (robbery)
4. High mountain
5. Polluted water (magazine)

Set VII - Which do you like to feel?
1. Moss
2. Sand paper
3. Plastics that are shiny
4. Bark of tree
5. Leaf.

Set VIII -Where would you prefer to live ?
(Guess locations - the environment of the home is not dependent on the location.)
1.
2.
3.
4.
5.

Set IX - Where would you prefer to spend an afternoon?
1. Marshall Park
2. Shopping center
3. Swimming pool
4. Library
5. Drag race.

Tapes - Set I- Which music do you like best?
1. Country western
2. Hard blaring rock
3. Symphony
4. 40's

Tapes - Set II - Which sound do you find most unpleasant?
1. Motorcycle
2. Train whistle
3. Nails against board
4. Bird song
5. School hallway.

Tapes - Set III - Which sound do you find most terrifying?
1. Creaking door
2. Ambulance
3. Erie music
4. Explosion
5. Car crash.

V. RESOURCES

Living in the Environment: Concepts, Problems, and Alternatives, G. Tyler Miller, Jr., Wadsworth Publishing Company, Inc., 9400 Belmont, California, 1975.

Noise Pollution, Mary Beth Durner, Environmental Education Center, 13 Veterans Drive, Oteen, N.C., 28805.(Information free to N.C. schools. This is also available in Charlotte - Environmental Center, Nature Museum.)

An Introduction to the Urban Environment, Mary Beth Durner, EEC, 13 Veterans Drive, Oteen, N.C. 28805.

Noise Pollution, U.S.EPA, Supt. of Documents, U.S.Government Printing Office, Washington, D.C. 20402 35¢ Stock # 5500 - 0072.

Noise the Harmful Intruder in the Home, USEPA, Washington, D.C. Supt. of Documents, U.S.Government Printing Office, Washington, D.C. 20402. 15¢

Man and His Environment: In Harmony and In Conflict, The Center for Humanities, Inc. (Available through Environmental Center, Nature Museum, Charlotte, N.C.) Humanities, Inc.,White Plains, N.Y.10603.

VI. APPENDIX

A. Whose Garden Was This?

Whose garden was this?
It must have been lovely.
Did it have flowers?
I've seen pictures of flowers.
And I'd love to have smelled one!

Whose river was this?
You say it ran freely?
Blue was its color?
I've seen blue in some pictures,
And I'd love to have been there!

Ah, tell me again, I need to know:
The forest had trees,
The meadows were green,
The oceans were blue,
And birds really flew,
Can you swear that was true?

Whose gray sky was this?
Or was it a blue one?
Nights there were breezes?
And you tell me you felt one.

Ah, tell me again, I need to know:
The forest had trees,
The meadows were green,
The oceans were blue,
And birds really flew,
Can you swear that was true?

B. Additional Activities for Environmental Sounds.
Created by: Jo Michalski, Environmental Education Technician, Alaska Department of Education, Pouch F. State Office Building, Juneau, Alaska 99811.

Goal: To develop an awareness of the variety of sounds in the students' environment.

Activity Design:

1. Without moving any part of your body, make a sound. Can you do it? Now try it by moving some part of your body. List all the ways you can make a sound just by using your body. Here are some examples:
   a. Snap fingers
   b. Clap hands
   c. Cough
   *Which sounds on your list happen inside the body?
   *Which sounds happen outside the body?
   *Can other people hear all the sounds you listed?
   *What moved when you made each sound?
   *How did the sound get from its source to your ears?
   *How did it get to other people's ears?
2. Pick up a piece of paper. Time yourself. In one minute's time, make as many different sounds as you can using only that piece of paper and your body.
   a. List all the ways you did it. Here are some examples.
      1. Blowing on it.
      2. Hitting it with your finger.
      3. Whistling over the edge.
      4. Crumbling it into a ball.
   b. Compare lists with other students.
3. Take a rubber band. Time yourself. In one minute's time, make as many different sounds as you can using the rubber band and anything else at your desk.

a. Make a list of all the different things you did to produce a sound. Here are some examples.
   1. Snap it.
   2. Snap it against the desk.
   3. Snap it over a book.
   4. Stretch it and flick it.

b. Compare lists with other students.

4. Now using only your lungs, your throat, your tongue and your mouth and lips make as many different sounds as possible in one minute.
   a. List all the things you did to make a sound. Here are some examples.
      1. Grunt
      2. Whistle
      3. Push air against the lips.
      4. Clicked tongue
   b. Now compare the four lists you made. Group and label the different ways you made sound.
   c. Compare your classifications with those of other students.
   d. How did you label the "whistle"?
   e. Did you group "tongue clicking" with "rubber band snapping"? Why?
   f. What about "coughing" and crumbling the paper into a ball"?
   g. Were any of the sounds pleasant? Were any unpleasant?
5. Divide into small groups (4-5 students each) and discuss the following questions:
   a. What are the pleasant sounds you hear inside your house?
   b. What sounds are unpleasant?
   c. What are the pleasant sounds you hear outside? What sounds are unpleasant?
   d. Why are some sounds considered to be music or pleasant to hear and other sounds are regarded as noise pollution?
6. Assignment: Go home tonight after school and pick out a place in your house to sit. Stay there for five minutes and listen to all the sounds you hear. List all the sounds you hear. Then go outside and find a place to sit. Stay there for five minutes and list all the sounds you hear there.
7. Divide into the same small groups and share the sounds you heard and listed during your five minutes inside and five minutes outside. Decide whether the sounds were pleasant or unpleasant. Did you hear any new sounds that your group didn't think of during the No. 5 task?
8. Give each group a tape-recorder and this assignment: "Develop a five minute presentation of sounds that makes a statement about our environment. Include as many sounds as you like." Allow enough time for students to decide what sounds to record; record these sounds and develop their "statement."
9. Have each group present their "environmental sound statement" to the rest of the class. After each "statement" allow the class to discuss what they heard. Does everybody agree on what the "statement" says about our environment of sounds?
10. Have these same groups develop five minutes of "music" using sounds from their environment: present and discuss the sound "music."
11. Discussion:
    . What effect do sounds have on people?
    . What can students do to make our environmental sounds more like"music?
    . What can the city, business, industries, etc.,do?